SOUTH CAROLINA ELECTRIC & GAS COMPANY

Cayce, South Carolina

V.C. SUMMER NUCLEAR STATION

UNITS 2 AND 3

TRANSMISSION LINE SITING and ENVIRONMENTAL REPORT

VCS1-Killian 230 kV Line

Fairfield and Richland Counties, SC

JULY 2011

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1.0 Introduction and Overview of New 230 kV Lines Associated with V.C. Summer Nuclear Station Units 2 and 3

South Carolina Electric & Gas Company ("SCE&G") has prepared this report pursuant to The South Carolina Utility Facility Siting and Environmental Protection Act, S.C. Code Ann. § 58-33-10 *et seq.* (1976, as amended), for the proposed 230 kilovolt ("kV") transmission line extending from SCE&G's V.C. Summer Nuclear Station Unit 1 Switchyard near Jenkinsville, South Carolina, to its existing Killian 230/115 kV Substation, which is approximately six (6) miles south of Blythewood, South Carolina. The length of this 230 kV transmission line is approximately 37 miles. Throughout this report, the proposed transmission line is referred to as the **VCS1-Killian 230 kV Line**, **VCS1-Killian Line** or **Line**.

The VCS1-Killian Line is one of four (4) new 230 kV transmission lines that SCE&G must build in order to reliably transmit the power generated by V.C. Summer Nuclear Station Units 2 and 3 to SCE&G's customers.[1] In addition to the specific information contained in this report focusing on the VCS1-Killian 230 kV Line, Chapters 1, 2, and 3 of this report also include general information about the other three (3) new 230 kV lines.

1.1 Background Information

SCE&G, a wholly-owned subsidiary of SCANA Corporation, supplies electrical energy to more than 660,000 customers covering nearly 17,000-square miles of electric service area that includes all or portions of 24 counties in central and southern South Carolina (*Figure 1.1-1*).

[1] *In addition to the new SCE&G 230 kV lines, the South Carolina Public Service Authority must build two (2) new 230 kV lines in conjunction with the VCSNS Units 2 and 3 project.*

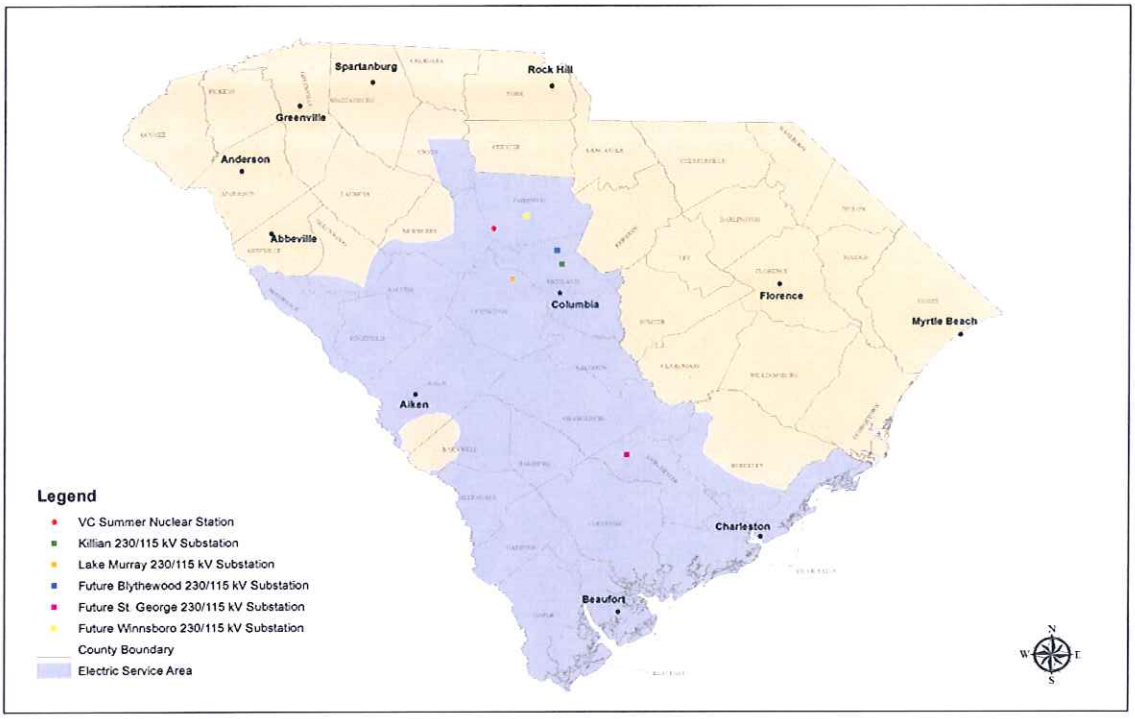


Figure 1.1-1 SCE&G Electric Service Area

To maintain an adequate supply of reliable, electrical energy to serve the projected future demand throughout South Carolina, SCE&G and Santee Cooper submitted an application on March 31, 2008, to the Nuclear Regulatory Commission ("NRC") requesting the issuance of a combined construction and operating license ("COL") for two new nuclear generating units. The COL, when issued, will authorize SCE&G and Santee Cooper to build and operate two additional nuclear generating units at the existing V.C. Summer Nuclear Station site near Jenkinsville, South Carolina. Each unit will have a net electrical output of 1,117 megawatts. Additionally, on May 30, 2008, SCE&G filed with the Public Service Commission of South Carolina a Combined Application for a Certificate of Environmental Compatibility and Public Convenience and Necessity and for a Base Load Review Order for the construction and operation of the new nuclear units. On March 2, 2009, the Commission issued Order No. 2009-104(A) granting SCE&G, among other things, a Certificate of Environmental Compatibility and Public Convenience and Necessity for the new nuclear units.

Throughout this report, the two new nuclear generating units, V.C. Summer Nuclear Station Unit 2 and Unit 3, are referred to as **VCSNS Units 2 and 3**; the existing nuclear generating unit at the V.C. Summer Nuclear Station is referred to as **VCSNS Unit 1**. The existing electrical

switchyard associated with VCSNS Unit 1 is referred to as **VCSNS Switchyard 1**; the switchyard that will serve VCSNS Units 2 and 3 is referred to as **VCSNS Switchyard 2**.

1.2 Required New 230 kV Lines Associated with VCSNS Units 2 and 3

SCE&G and Santee Cooper have determined that six (6) new 230 kV circuits originating at the V.C. Summer Nuclear Station are necessary to reliably interconnect the generated capacity of VCSNS Units 2 and 3 to their respective electric transmission grids. SCE&G plans to construct four (4) new 230 kV circuits; Santee Cooper will construct two (2) new 230 kV circuits. Below is a listing and summary description of the four (4) new SCE&G 230 kV circuits:

1. **V.C. Summer Nuclear Station-Killian 230 kV Line**
   This new 230 kV circuit will run between the existing VCSNS Switchyard 1 and SCE&G's existing Killian 230/115 kV Substation, approximately six (6) miles south of Blythewood, South Carolina. This line is referred to as the **VCS1-Killian 230 kV Line**, **VCS1-Killian Line** or **Line**.

2. **V.C. Summer Nuclear Station-Lake Murray 230 kV Line No. 2**
   This new 230 kV circuit will connect the future VCSNS Switchyard 2 to SCE&G's existing Lake Murray 230/115 kV Substation located near SCE&G's McMeekin and Saluda Hydro Stations, approximately three (3) miles southwest of Irmo, South Carolina. This line is referred to as the **VCS2-Lake Murray 230 kV Line No. 2**.

3. **V.C. Summer Nuclear Station-St. George 230 kV Lines No. 1 and No. 2**
   These two new 230 kV circuits will originate at the VCSNS Switchyard 2 and run to SCE&G's new 230/115 kV substation to be constructed near St. George, South Carolina. These 230 kV circuits are referred to collectively in this report as the **VCS2-St. George 230 kV Lines**.

The scheduled completion dates for the new SCE&G 230 kV lines are shown in Chart 1.2-1.

Chart 1.2-1: Scheduled Completion Dates for SCE&G 230 kV Lines Associated with VCSNS Units 2 and 3

VCS1-Killian 230 kV Line	December 31, 2014
VCS2-Lake Murray 230 kV Line No. 2 and the segment of the VCS2-St. George Line No. 1 that will run from the VCSNS Switchyard 2 to, and be temporarily terminated on, the Lake Murray 230/115 kV Substation	December 31, 2014
VCS2-St. George 230 kV Line No. 1 (Lake Murray-St. George Segment) and VCS2-St. George Line No. 2	December 31, 2018

The following schematic diagram, Figure 1.2-1, displays the four (4) new lines that SCE&G must build to transmit power from VCSNS Units 2 and 3.

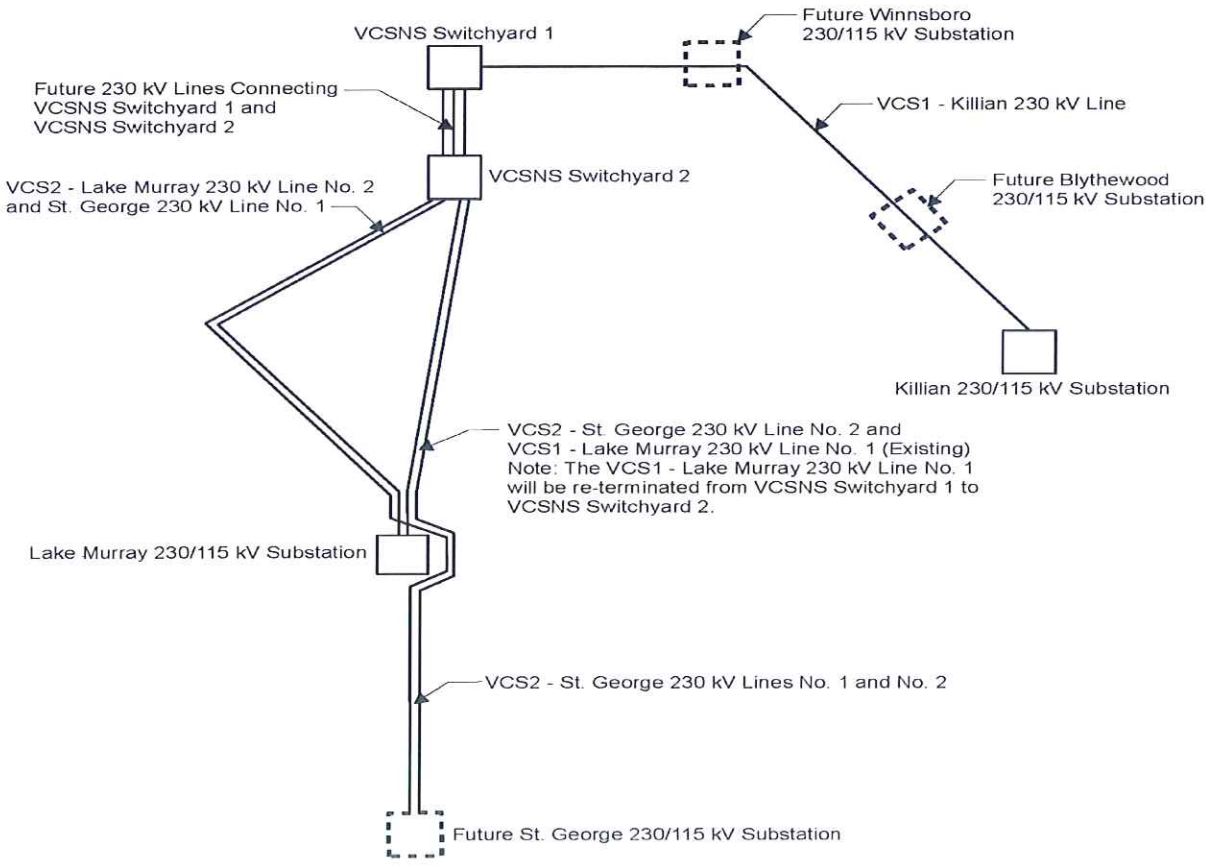


Figure 1.2-1 Schematic Diagram of Required New SCE&G 230 kV Lines

2.0 Alternate Transmission Line Routes Considered

2.1 Transmission Line Route Selection Overview

To support a timely application filing with the NRC for a COL for VCSNS Units 2 and 3, SCE&G conducted siting studies in late 2007 and 2008 to identify potential routes for the VCS1-Killian 230 kV Line and VCS2-St. George 230 kV Lines. At the time of the siting studies, SCE&G anticipated the VCS2-Lake Murray 230 kV Line No. 2 would be constructed along existing right-of-way for its entire length; consequently, SCE&G did not include this line in the siting studies to determine a potential line route. Hence, the objective of the siting studies was to identify potential routes for the VCS1-Killian and VCS2-St. George Lines through relatively low-constraint areas, as determined by the application of data collection and analysis methodologies inherent to SCE&G's formal, comprehensive transmission line siting process. The development of potential routes allowed the quantification of impacts to land use, environmental resources, cultural resources, and scenic resources in the vicinity of each potential route. Additionally, impacts were assessed and quantified along the planned, existing right-of-way route of the VCS2-Lake Murray 230 kV Line No. 2.

The siting studies and quantification of impacts associated with potential routes and the existing right-of-way of the future VCS2-Lake Murray 230 kV Line No. 2 allowed SCE&G to provide potential transmission line impact data to the NRC to support preparation of the Draft Environmental Impact Statement for VCSNS Units 2 and 3 in a timely manner. Providing the data to the NRC complied with the requirements of the National Environmental Policy Act that the Environmental Impact Statement for VCSNS Units 2 and 3 include all impacts ("cumulative impacts") associated with the proposed action, including associated transmission lines. SCE&G concluded that environmental, cultural, and land use resource effects associated with the final, precise line routes would be very similar in magnitude to the effects that were assessed for the potential line routes and the existing right-of-way route of the VCS2-Lake Murray 230 kV Line No. 2.

When the impact data associated with potential line routes and the route of VCS2-Lake Murray 230 kV Line No. 2 were submitted to the NRC in August 2008, SCE&G anticipated conducting detailed siting studies according to their formal, comprehensive three phase siting process to select final routes for the VCS1-Killian Line and the VCS2-St. George Lines. SCE&G planned to replace the potential routes with the final routes and quantify impacts associated with them on a schedule that would support their licensing and construction on a timely basis relative to

completion of VCSNS Units 2 and 3. The following schedule was developed for the detailed siting studies:

Line	Planned Siting Study Timeframe
VCS2-Lake Murray 230 kV Line No. 2	No siting study required
VCS1-Killian 230 kV Line	2011-2012
VCS2-St. George 230 kV Lines No. 1 and No.2	2015-2016

Prior to the 2008 siting studies to identify potential routes for the VCS1-Killian 230 kV line, SCE&G load growth studies determined a future 230/115 kV substation site (Winnsboro 230/115 kV substation) would be needed in the Winnsboro area to support future electric demand in this northeastern region of its service area and along the Interstate 77 (I-77) corridor. Therefore, the decision was made to identify potential routes through the Winnsboro area. Subsequently, a suitable tract of land next to SCE&G's existing Parr-Winnsboro #1 and #2 115 kV Lines, approximately 2 miles west of Winnsboro, South Carolina was purchased for the future 230/115 kV substation. The location of this site allowed SCE&G to finalize a decision to build the line segment of the VCS1-Killian 230 kV line between the VCSNS Switchyard 1 and the future Winnsboro 230/115 kV Substation on existing right-of-way by replacing the existing Parr-Winnsboro #1 115 kV Line (single-circuit H-Frame structures) with a double-circuit 230/115 kV line. Therefore, the comprehensive siting study planned for the VCS1-Killian 230 kV Line only included the section of the line between the future Winnsboro 230/115 kV substation site and the Killian 230/115 kV Substation.

In 2009, SCE&G initiated two (2) comprehensive siting studies to determine the route for the VCS1 Killian Line between the future Winnsboro 230/115 kV Substation site and the existing Killian 230/115 kV Substation. One siting study, initiated in early 2009, involved a segment of the VCS1-Killian line between the site of another future 230/115 kV substation near Blythewood, SC ("Blythewood 230/115 kV Substation") and the existing Killian Substation (the "Blythewood-Killian Segment").[2] The second siting study, which began in late 2009, was for the line segment between the future Winnsboro and Blythewood 230/115 kV substation sites ("Winnsboro-Blythewood Segment").

[2] *As determined by SCE&G system planning studies, the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line will be constructed as a double-circuit 230/115 kV line rather than a single circuit 230 kV line to accommodate the need for a second 115 kV circuit between Blythewood and Killian Substations.*

Concurrent with the 2008 transmission line siting studies that identified the potential routes and the two (2) 2009 comprehensive siting studies for the two segments of the VCS1-Killian 230 kV Line (Winnsboro-Blythewood and Blythewood-Killian Segments), SCE&G began comprehensive investigations to determine how existing SCE&G transmission line rights-of-way could be utilized to the maximum extent practicable as routes for the four (4) new SCE&G 230 kV transmission lines associated with VCSNS Units 2 and 3. Although the potential routes developed in the 2008 siting studies had portions *paralleling existing transmission line rights-of-way* for significant distances, the decision to conduct investigations to determine the viability of building the new 230 kV lines *within existing rights-of-way* was made due to significant scheduling considerations along with comments SCE&G received from several state and federal agencies. SCE&G was keenly aware that conducting comprehensive siting studies and selecting final routes, surveying the routes and acquiring right-of-way posed substantial schedule risks in terms of completing line construction on schedules that would support the completion schedules of VCSNS Units 2 and 3. Additionally, in meetings and telephone conferences with the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, the State Historic Preservation Office, and the S.C. Department of Natural Resources, agency representatives expressed strong preferences for the use of existing rights-of-way, if practical, as compared to siting and developing new green field transmission line routes. Consequently, SCE&G's existing right-of-way utilization investigation focused both on the use of available, unoccupied portions of existing rights-of-way and on engineering studies to determine the viability of redesigning/rebuilding/relocating existing lines within the rights-of-way to provide space for the addition of the new 230 kV lines.

By the third quarter of 2010, SCE&G determined that all four (4) of the new 230 kV lines could be built within existing rights-of-way, with one minor exception. The Blythewood-Killian Segment of the future VCS1-Killian 230 kV Line (as discussed above), which is approximately 6 miles in length, would require the acquisition of new right-of-way. Moreover, SCE&G by this time had completed the siting study and selected a route for the Blythewood-Killian Segment (see Section 2.2).

For the Winnsboro-Blythewood Segment, a transmission line siting study was underway, the first community workshop had been held (April 15, 2010) and, subsequent to the community workshop, twenty-four (24) alternate routes had been developed. However, as part of the existing right-of-way use investigation, SCE&G determined an existing right-of-way could be utilized for the Winnsboro-Blythewood Segment by removing the existing 115 kV single-circuit, line and structures

and installing a double-circuit 230/115 kV line with structures that would accommodate both the VCS1-Killian 230 kV Line and the existing 115 kV line within the right-of-way. Rather than immediately aborting the siting study that was underway, SCE&G elected to add this existing right-of-way option as the 25th alternate route and complete the evaluation for the Winnsboro-Blythewood Segment alternates according to the alternate route evaluation protocol of the SCE&G comprehensive transmission line siting process. Based on the siting study alternate route evaluation protocol, the magnitude of effects to environmental, cultural, land use and scenic resources associated with building the Winnsboro-Blythewood Segment of the VCS1-Killian 230 kV Line on the existing right-of-way is reduced when compared to the green field route.

The following narratives (1, 2, & 3) describe the final routes selected for the VCS1-Killian 230 kV Line, the VCS2-Lake Murray 230 kV Line No. 2 and the VCS2-St. George 230 kV Lines No. 1 and No. 2 a result of the existing right-of-way use investigation and the siting study for the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line:

1. **VCS1-Killian 230 kV Line** – Originating at the VCSNS Switchyard 1, this 230 kV circuit will run to SCE&G's existing Killian 230/115 kV Substation. The total length is approximately 37 miles and is routed entirely within existing SCE&G rights-of-way except for the Blythewood-Killian Segment, which is approximately 6 miles long. The line will be constructed within SCE&G's existing Parr-Winnsboro right-of-way from the VCSNS Switchyard 1 to Winnsboro (VCSNS-Winnsboro Segment) and the existing Winnsboro-Blythewood right-of-way from Winnsboro to Blythewood (Winnsboro-Blythewood Segment). The Blythewood-Killian Segment will occupy a new right-of-way that SCE&G sited and selected by executing its comprehensive, three-phase transmission line siting process.[3] The process included public involvement via a community questionnaire and two community workshops. Section 2.2, below, further describes the siting process SCE&G executed to select the route for the Blythewood-Killian Segment. This segment will also be constructed as double circuit 230/115 kV to accommodate the VCS1-Killian 230 kV line and a required, second 115 kV Line

[3] *Section 2.3 describes a scenario whereby SCE&G, due to critical schedules associated with VCSNS Unit 2, may have to build the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line on an existing 115 kV line right-of-way that runs between the site of the future Blythewood 230/115 kV Substation and the existing Killian 230/115 kV Substation. Due to this possible occurrence, Chapter 5 of this report describes both the environmental consequences that would occur if the VCS1-Killian Line utilizes the new right-of-way (Option 1) or the environmental consequences that would occur if the VCS1-Killian Line utilizes the existing right-of-way (Option 2).*

between the existing Killian and future Blythewood 230/115 kV Substation (see Section 2.3).

2. **VCS2-Lake Murray 230 kV Line No. 2** – This 230 kV circuit will connect the VCSNS Switchyard 2 to the existing Lake Murray 230/115 kV Substation near SCE&G's McMeekin Steam Generating Plant and Saluda Hydro Station. The length of the VCS2-Lake Murray 230 kV Line No. 2 is approximately 22 miles. The Lake Murray Line No. 2 will be built entirely within existing right-of-way by utilizing portions of SCE&G's Parr Hydro-Chapin and Saluda Hydro-Newberry rights-of-way. These two existing SCE&G rights-of-way intersect at a point that is referred to as Chapin Junction. The Saluda Hydro-Newberry right-of-way ends near SCE&G's existing Lake Murray 230/115kV substation. Both rights-of-way will accommodate the new line with minimal modifications. The Parr Hydro-Chapin Junction segment will share the right-of-way with an existing SCE&G distribution line; the Chapin Junction-Lake Murray segment will share the right-of-way with an existing double-circuit 115 kV lattice tower line. The VCS2-Lake Murray 230 kV Line No.2 will be constructed as a single pole, double-circuit 230 kV line to accommodate the VCS2-St. George 230 kV Line No.1 from the VCSNS Switchyard 2 to the Lake Murray 230/115 kV Substation.

3. **VCS2-St. George 230 kV Lines No. 1 and No. 2** – These two 230 kV circuits will originate at the VCSNS Switchyard 2 and run to a new 230/115 kV substation near St. George, South Carolina. The length of the VCS2-St. George Line No.1 will be approximately 98 miles; the VCS2-St. George Line No. 2 will be approximately 94 miles long. Departing the switchyard, the VCS2-St. George Line No. 1 will run with the new VCS2-Lake Murray Line No. 2 along the existing Parr Hydro-Chapin and Saluda Hydro-Newberry rights-of-ways to the existing Lake Murray 230/115 kV Substation area. The VCS2-St. George Line No. 2 will exit the VCSNS Switchyard 2 and run with the existing VCS1-Lake Murray 230 kV Line No. 1 to a point where it will intersect the VCS2-Lake Murray Line No.2/St. George Line No. 1 near the Lake Murray 230/115 kV Substation. From this intersection, the VCS2-St. George Lines No. 1 and 2 will run together in various existing SCE&G rights-of-way for approximately 76 miles to a new 230/115 kV Substation near St. George, South Carolina. For the most part, existing SCE&G single pole or H-Frame 115 kV and 230 kV lines will be removed and rebuilt as double-circuit, single pole 115/230 kV and/or 230/230 kV configured lines on existing rights-of-way to accommodate the VCS2-St. George 230 kV Lines No. 1 and 2.

The total combined circuit length of the four new SCE&G lines (VCS1-Killian, VCS2-Lake Murray No. 2, VCS2-St. George No. 1, and VCS2-St. George No. 2) will be approximately 251 circuit-miles (157 corridor-miles). Except for approximately 6 miles of new right-of-way associated with the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line, the four new lines will be built entirely within existing SCE&G rights-of-way corridors. In addition to these four (4) new 230 kV Lines, SCE&G will construct three (3) 230 kV tie lines on the V.C. Summer Nuclear Station site to connect the existing VCSNS Switchyard 1 to the future switchyard that will serve VCSNS Units 2 and 3 (VCSNS Switchyard 2). The cumulative length of the three (3) tie lines will be approximately 3 miles, and they will be located entirely on property currently owned by SCE&G (the VCSNS site).

Figure 2.1-1 displays the locations of the four (4) new SCE&G 230 kV circuits that will be built in conjunction with VCSNS Units 2 and 3; Figure 2.1-2 displays the locations of the three (3) tie lines that will connect the existing VCSNS Switchyard 1 to the new VCSNS Switchyard 2.

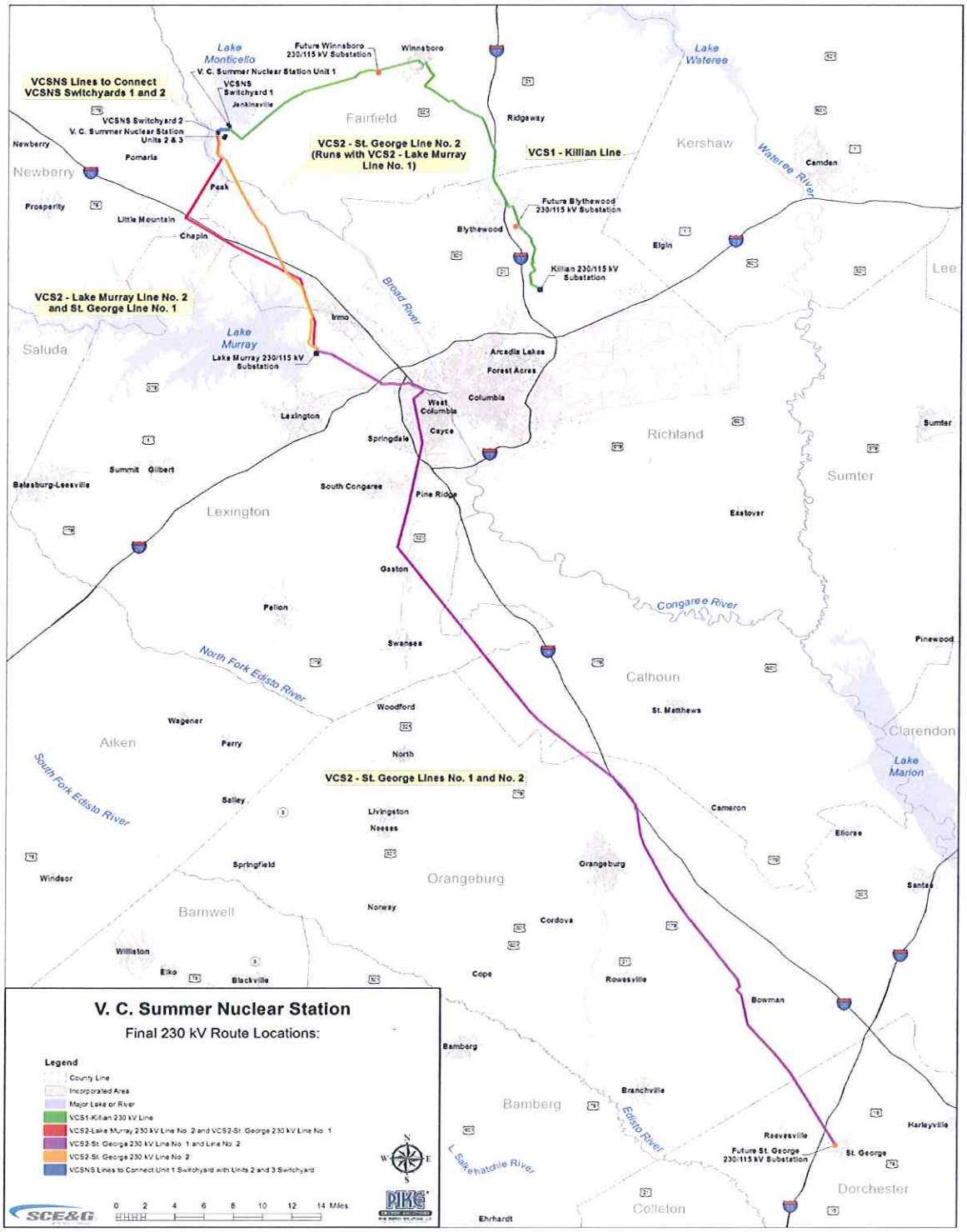


Figure 2.1-1 SCE&G 230 kV Lines Associated with VCSNS Units 2 and 3 Line Route Locations

(VCS1-Killian 230 kV Line; VCS2-Lake Murray Line No. 2; and VCS2-St. George Lines No. 1 and No. 2)

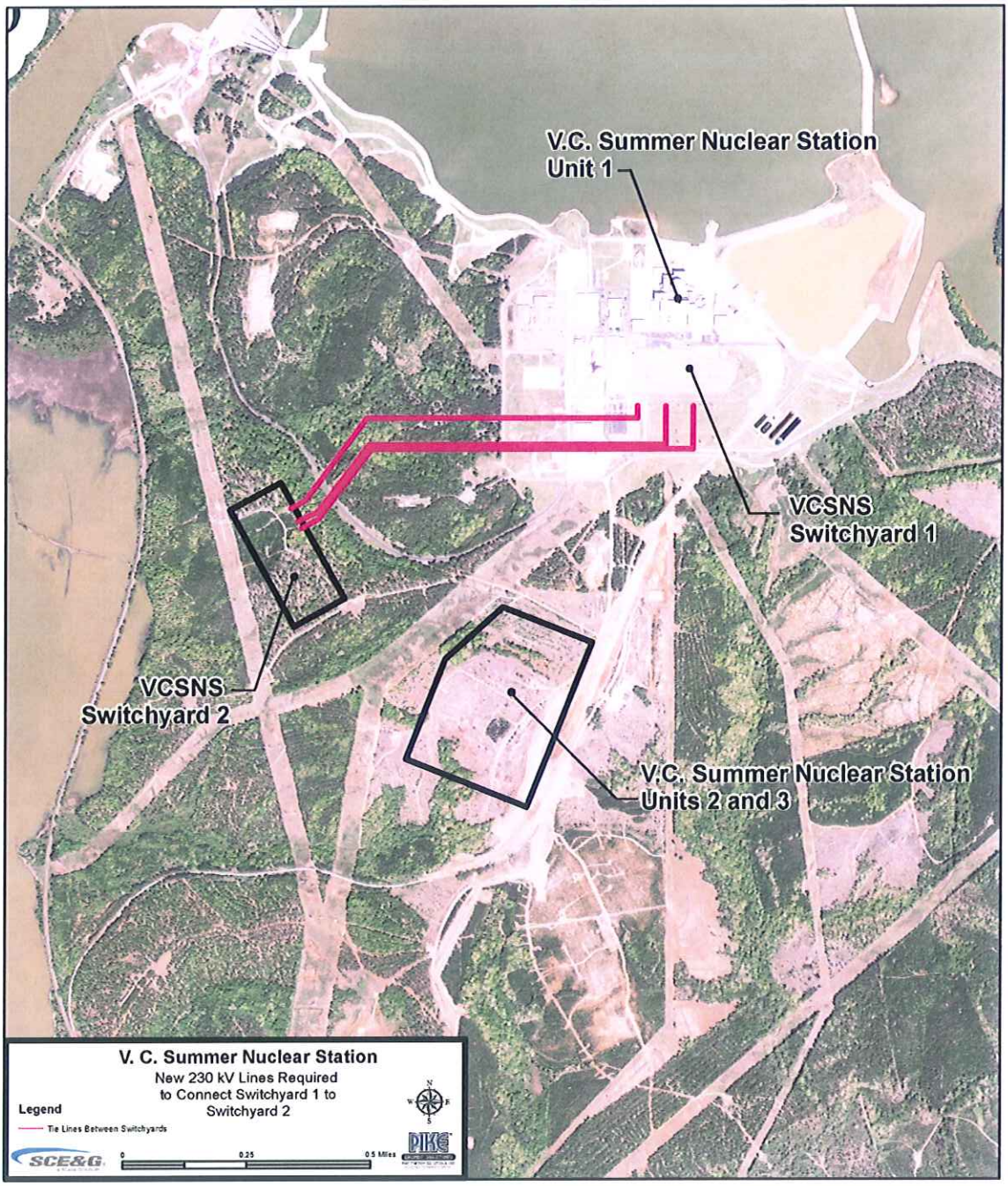
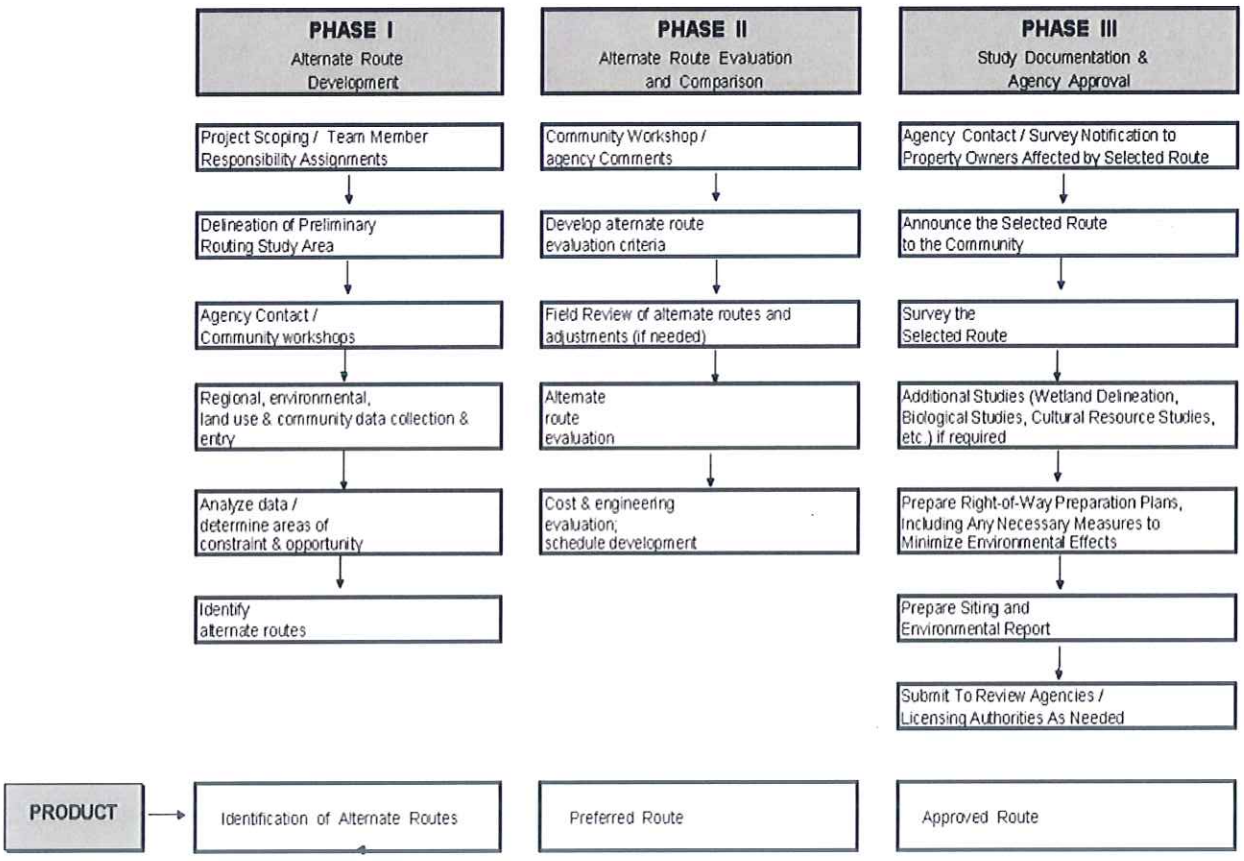


Figure 2.1-2 Line Route Locations of SCE&G 230 kV Lines Required to Connect VCSNS Switchyard 1 to VCSNS Switchyard 2

2.2 Route Selection of the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line

SCE&G conducted a comprehensive siting study for the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line by applying its formal Transmission Line Siting Process that is illustrated in *Chart 2.2-1*, below. A 19.3 square-mile geographic siting study area was delineated that included the area through which any practical transmission line route would be located between SCE&G's future Blythewood 230/115 kV Substation and the existing Killian 230/115 kV Substation (*Figure 2.2-1*). Aerial photographs, topographic maps, and field investigations were used to gather and map data regarding development, scenic characteristics and infrastructure in the siting study area. Land cover was modeled from satellite imagery using remote sensing software, supplemented by field reconnaissance. Federal, state, and local agencies were contacted to obtain land use, cultural resource, future development plans, and environmental information pertinent to the siting study area.

Chart 2.2-1 SCE&G Three-Phase Transmission Line Siting Process



After collecting and mapping an array of environmental, cultural resource, land use and scenic resource data that would influence alternate route development, but prior to developing any alternate routes, SCE&G hosted the first community workshop on October 29, 2009, at Killian Park in Blythewood, South Carolina. The primary purpose of the workshop was to gather substantive information from the public for inclusion in the siting process and to provide attendees complete information about all aspects of the project. Prior to the community workshop, SCE&G invited each property owner of record within the 19.3 square-mile siting study area to the workshop by direct-mail invitation. A total of 3,250 invitations were mailed to the individual property owners; forty (40) additional invitations were mailed to elected officials and other community leaders. Each invitation included a map showing the siting study area and a community questionnaire that invitees were encouraged to complete and return to SCE&G. The questionnaires were designed to gain insight into community priorities, concerns, and general information about any factor anyone believed should be considered in the siting study.

The community workshop allowed the SCE&G project team to fully demonstrate/explain the siting process/approach and fully explain the need for the new transmission lines. All attendees were encouraged to share information they deemed relevant to the siting study. A total of 106 people attended the first public workshop.

The workshop followed an informal format thereby allowing guests to attend at their convenience, spend as much time as they wished reviewing the data, and focus on specific areas of interest to them. For example, subject matter experts from the project team were available at information workstations to discuss EMF, project need, right-of-way acquisition, visual issues (including typical line structures), environmental issues, and the siting process. The key objectives of the community workshop were:

- To give the affected community an opportunity to participate in the siting process;
- To gather information that should be considered when developing, evaluating, and comparing alternative routes;
- To fully inform the community about all aspects of the project;
- To gain insight into community priorities; and,
- To communicate the fair, balanced, and comprehensive nature of SCE&G's Transmission Line Siting Process.

The community workshop structure (i.e., decentralized presentations/discussions at subject matter information workstations as individuals and small groups move from one information

workstation to another) provides significant benefits. First, it gives the public an opportunity to talk directly with siting project team members who can fully discuss issues or concerns presented by the public. Second, it gives the public an opportunity to gain information about the project directly from the "front-line" team that has determined the project to be necessary, is siting the line, and will be acquiring new right-of-way.

The data for the siting study area that had been mapped prior to the October 29th community workshop had been organized into fifteen (15) geographic information system ("GIS") data layers and, with exception of the Cultural and Historic Resources and Natural Resources data layers, all were on display at the community workshop. SCE&G does not publicly display information or maps depicting the precise locations of recorded archaeological sites or the locations of documented protected species pursuant to agreements with the SC Department of Archives and History and SC Department of Natural Resources,

The following is a list of the fifteen (15) GIS data layers (*Figures 2.2-1 through 2.2-15*).

1. Regional Transmission Facilities
2. Aerial Photography with Property
3. Cultural Resources (historic and archaeological)
4. Natural Resources (protected species)
5. USGS 7.5' Quadrangle
6. Land Cover
7. Prime and Important Farmlands
8. Hydrography
9. Wetlands
10. FEMA Flood Zones
11. Community Amenities and Public Infrastructure
12. Zoning
13. Occupied Buildings
14. Future Land Use
15. Public Visibility

Following the first community workshop, SCE&G researched, verified, and added data received from the public, including information that was submitted in 142 completed community surveys, to the appropriate GIS data layers.

Numeric weights were assigned to each individual data factor included on each of the fifteen (15) data layers to represent their relative sensitivity to transmission line routing. The weighted data (*Table 1*) were combined in the GIS, and a single map was developed that

represented the cumulative effect of all weighted data to line routing. The map is referred as a *Suitability Composite* (*Figure 2.2-16*) and displays the areas of highest constraint to routing the proposed 230 kV line, the areas of lowest constraint, and the full range of conditions between the highest and lowest within the 19.3 square-mile siting study area. SCE&G used the Suitability Composite Map to develop nineteen (19) alternate routes through comparatively low constraint areas to the extent practical for further analysis and evaluation (*Figure 2.2-17*).

Following development, mapping, and field inspections of the alternate routes, a second community workshop was conducted on March 16, 2010, at Killian Park in Blythewood. SCE&G extended direct-mail invitations to 3,281 property owners of record in the siting study area and 44 additional invitations to elected officials and other community leaders prior to the community workshop. The purpose of the second community workshop was to present alternate routes, provide additional information about the project, further demonstrate the transmission line siting process, and give the public another opportunity to provide information they believed should be considered as SCE&G evaluated the alternate routes prior to selecting a final one for the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line. Eighty-eight (88) people attended the second workshop. SCE&G representatives encouraged each of the attendees to carefully examine the locations of the nineteen (19) alternate routes displayed on an array of mapping, visit "workstations" where complete information was available regarding all aspects of the project, and to offer any information that could influence the evaluation of any of the alternate routes. The second community workshop included the following workstations:

- Project Need and Engineering
- Transmission Line Siting
- Environmental Protection Practices
- Aesthetic Considerations
- Electric and Magnetic Fields
- Surveying and Right-of-Way Acquisition Procedures

Present at each workstation were SCE&G project team members who were actively engaged in project planning, engineering, and siting. The statistical analysis results of the completed community surveys that had been completed in conjunction with the October 29, 2009 workshop were also displayed at the March 16th workshop (*Appendix B*). The analysis revealed that the predominant concerns of residents and property owners in the siting study area were the future line's potential effects on residential property and its visibility from homes.

Using information gathered during the siting study, provided in completed community questionnaires, and gained during the two community workshops, SCE&G identified the following

nine (9) route evaluation categories to quantitatively and qualitatively compare the nineteen (19) alternate routes:

1. Cultural Resource Factors
2. Natural Resource Factors
3. Land Cover Factors
4. Property Ownership Factors
5. Land Use Factors
6. Occupied Building Factors
7. Public Visibility Factors
8. Residential Visibility Factors
9. Water Quality Factors

Within each category, criteria were developed that allowed a quantitative and qualitative evaluation and comparison of the alternate routes based on the sensitivity of each data factor to transmission line construction and long-term operation. A weight ranging between 1 and 10 was assigned to each data factor according to its sensitivity to the proposed transmission line. The most sensitive data factors within each evaluation category received a weight of 10, and less sensitive data factors received lower weights. (For example, homes within 200' of the proposed line where it would not be parallel and adjacent to an existing line were given the highest weight of 10. Homes between 200' and 500' of the proposed line were given weights of 6, and homes from 500-1000' away from the proposed line where it would not be parallel and adjacent to an existing line were given weights of 4. In this example, the reduction in sensitivity correlates to increased distance from the future line and the absence of landscape modifications resulting from existing lines.) The factor weights were then multiplied by each factor quantity (units, miles, acres, etc.) in each evaluation category for each alternate route to calculate individual factor scores. Individual factor scores for each route were then added to arrive at a total evaluation category score for each alternate route in each evaluation category (*Table 2*).

The total evaluation category scores were normalized on a one to ten scale. Normalizing the scores on a one to ten scale in each evaluation category prevents any single evaluation category from unjustifiably influencing the overall route score (the total of all evaluation category scores for each alternate route). For example, the unit of measure in the Occupied Buildings Factors category is units (i.e., the number of buildings) and miles in the Public Visibility Factors category. The total evaluation score in the Occupied Buildings Factors category is often in the thousands compared to tens in the Public Visibility Factors category. Without score normalization, the magnitude of the score in the Occupied Buildings Factors category would render the Public Visibility Factors category, and all other evaluation categories, meaningless.

Score normalization was accomplished by dividing the score of the route with the highest total evaluation category score into the total score for each alternate route and multiplying the dividend by ten. For example, assuming the total evaluation category scores for 3 alternate routes are **369**, **327**, and **141**, normalization on a 1 to 10 scale would be calculated as follows:

369/369=1.0 (10)=**10** **327**/369=.886(10)=**8.86** **141**/369=.382(10)=**3.82**

The normalized evaluation category scores for the nine evaluation categories were then added to determine a total route evaluation score for each alternate route. Alternate routes with the lowest total evaluation scores are routes that minimize impacts over the broadest array of environmental, land use, cultural resource, and aesthetic factors that were used to evaluate them (*Table 3*).

The comprehensive evaluation determined that Route K is superior to the remaining 18 alternate routes that were evaluated. Approximately 6 miles long, Route K had the lowest overall route evaluation score due to comparatively low scores in each of the nine (9) evaluation categories.

Before making the final route selection decision, SCE&G completed comprehensive cost estimates for the alternate routes that ranked 1st through 5th in the line siting study. The siting study rank and cost estimates for the five (5) alternate routes are shown in Chart 2.2-2.

Chart 2.2-2: Siting Study Results and Estimated Cost [4]

Alternate Route	Siting Study Rank	Total Estimated Transmission Line Cost (Includes Estimated Cost of Right-of-Way)	Cost Rank
K	1	$6,588,000	1
O	2	$6,766,000	3
H	3	$6,738,000	2
R	4	$6,872,000	5
J	5	$6,846,000	4

[4] *The estimated costs shown for each alternate route reflect consistent assumptions made at the time of alternate route development and comparison. Estimated costs are subject to change once an actual survey is completed and more definite information about the precise length of the line, design of the line, material costs, right-of-way preparation costs and more representative right-of-way easement costs are determined. The most recent cost estimate for Route K is $9,100,000, which reflects more definitive information about the length, design, material cost and right-of-way easement cost. Similar increases would occur for each of the alternate route cost estimates if they were adjusted by application of the more detailed cost factors applied to the selected route; therefore, the selected route would remain one of the most economical of the alternate routes considered after adjusting the cost of all alternate routes based on more refined data.*

Alternate Route K (*Figure 2.2-18*) ranked 1st in the comprehensive siting study and was estimated to be the most economical of the five highest ranked routes in the siting study. Consequently, SCE&G selected it as the route for the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line. The right-of-way along the route will affect 41 land parcels owned by 30 landowners.

2.3 Possible Utilization of Existing Right-of-Way for the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line in Lieu of Selected Route K

As discussed in Section 2.2, SCE&G sited a new line route (Alternate Route K), approximately 6 miles long, for the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line, and as of the date of this report, the new route has been surveyed and right-of-way acquisition is underway.

In the unlikely event that SCE&G is unable to acquire the necessary right-of-way on a schedule that will allow the VCS1-Killian 230 kV Line to be energized by December 31, 2014, to support the VCSNS Unit 2 construction schedule, SCE&G has developed a contingency plan. The contingency plan entails building the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line on an existing 115 kV line right-of-way that runs between the future Blythewood 230/115 kV Substation site and the Killian 230/115 kV Substation. Currently, a single pole, single-circuit 115 kV line occupies this existing right-of-way, which is approximately 6 miles in length. Should it become necessary to build the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line on existing right-of-way to support the critical project schedule, SCE&G will remove/rebuild the existing 115 kV line and replace it with a single pole, double-circuit 230/115 kV line to accommodate the existing 115 kV line and the new 230 kV line.

Wherever it is necessary to distinguish between using the newly sited right-of-way and using the existing right-of-way for the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line in this report and on mapping included herein, the following nomenclature will be used:

- **VCS1-Killian 230 kV Line (Option 1)** will indicate utilization of the newly sited approximate 6 mile right-of-way between the future Blythewood 230/115 kV Substation and Killian 230/115 kV Substation (*Figure 2.3-1*).

- **VCS1-Killian 230 kV Line (Option 2)** will indicate utilization of the existing 6 mile right-of-way between the future Blythewood 230/115 kV Substation and Killian 230/115 kV Substation (*Figure 2.3-1*).

It is further noted that SCE&G's transmission system plans require a second 115 kV circuit between the Blythewood and Killian substations. SCE&G's current Option 1 plan accommodates this second 115 kV circuit by constructing the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line on single pole, double-circuit configured structures in the new right-of-way. This configuration will allow the second 115 kV circuit to run with the VCS1-Killian 230 kV Line on common structures. If future circumstances dictate that SCE&G use Option 2 and build the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line on the existing right-of-way, the new right-of-way will still be required for the second 115 kV line; therefore, SCE&G would continue to pursue the route and right-of-way easements for the second 115 kV line, which would be built as a single pole, single-circuit 115 kV line within the new right-of-way.

SCE&G is presently acquiring right-of-way and planning to use Option 1 for the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line; however, to fully prepare for the Option 2 contingency, SCE&G evaluated the environmental, cultural resource, land use and scenic resource effects that could potentially result from building the segment of the VCS1-Killian 230 kV Line on either the Option 1 or Option 2 route, and the results are presented in Chapter 5.

Figure 2.3-1, below, shows the routes of the VCS1-Killian 230 kV Line, Options 1 and 2, between the future Blythewood 230/115 kV Substation site and the existing Killian 230/115 kV Substation. There is no difference in Options 1 and 2 from the VCSNS Switchyard 1 to the future Blythewood Substation site where the VCS1-Killian 230 kV Line will be built entirely within existing SCE&G rights-of-way.

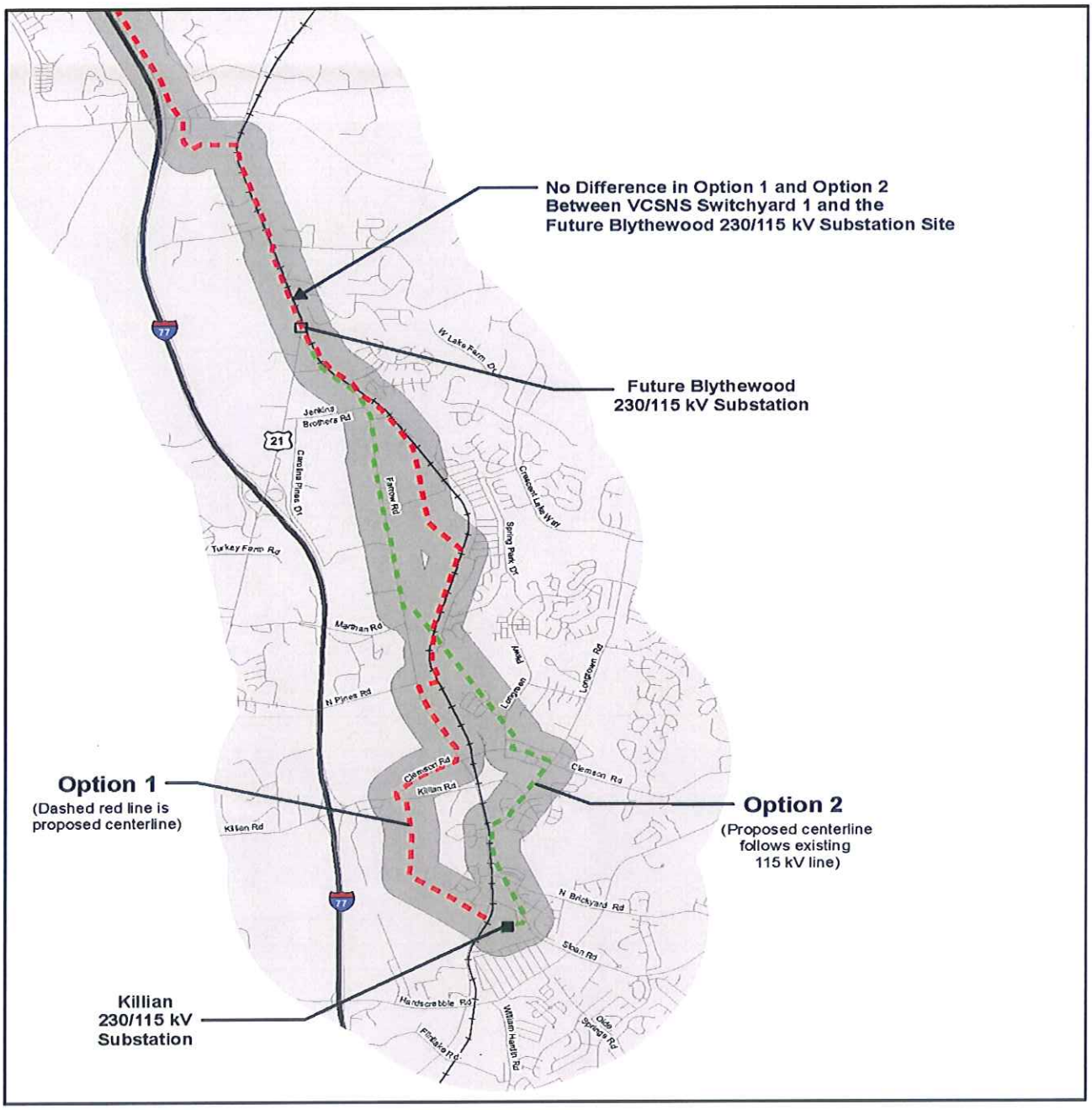


Figure 2.3-1 VCS1-Killian 230 kV Line Route Options 1 and 2

3.0 VCS1-Killian 230 kV Line Description

3.1 Transmission Line Description

SCE&G will use several types of its standard 230 kV line structures to construct the approximately 37 mile VCS1-Killian 230 kV Line. To enable the utilization of existing right-of-way, construction of the line will necessitate replacing existing line structures with new ones designed to carry the VCS1-Killian Line and the existing lines supported by structures to be removed. For example, on the Winnsboro Junction-Winnsboro Substation Segment of the VCS1-Killian Line, the existing wooden H-Frame structures of the single-circuit Parr-Winnsboro 115 kV Line No. 1 will be removed and replaced with double-circuit 230/115 kV steel pole structures designed to carry the VCS1-Killian 230 kV Line and the Parr-Winnsboro 115 kV Line No. 1. Chart 3.1-1 lists four (4) segments of the VCS1-Killian 230 kV Line (both Option 1 and Option 2 are shown for the Blythewood-Killian Segment) and references the figures (included below the chart) that graphically depict structure types to be removed and structure types to be built within each segment.

Chart 3.1-1 VCS1-Killian 230 kV Structure Types

Line Segment	Approximate Segment Length (Miles)	New Right-Of-Way Required?	Cross-Section Depicting Structures to be Removed and/or Added
VCSNS Switchyard 1-Winnsboro Junction	1	No	Figure 3.1-1
Winnsboro Junction-Winnsboro Substation	14	No	Figure 3.1-2
Winnsboro Substation-Blythewood Substation Site (Future)	16	No	Figure 3.1-3
Blythewood Substation Site (Future)-Killian Substation VCS1-Killian 230 kV Line (Option 1)	6	Yes*	Figure 3.1-4
Blythewood Substation Site (Future)-Killian Substation VCS1-Killian 230 kV Line (Option 2)	6	No*	Figure 3.1-5

* It may be necessary to build the Blythewood-Killian Segment of the VCS1-Killian Line on existing right-of-way (Section 2.3).

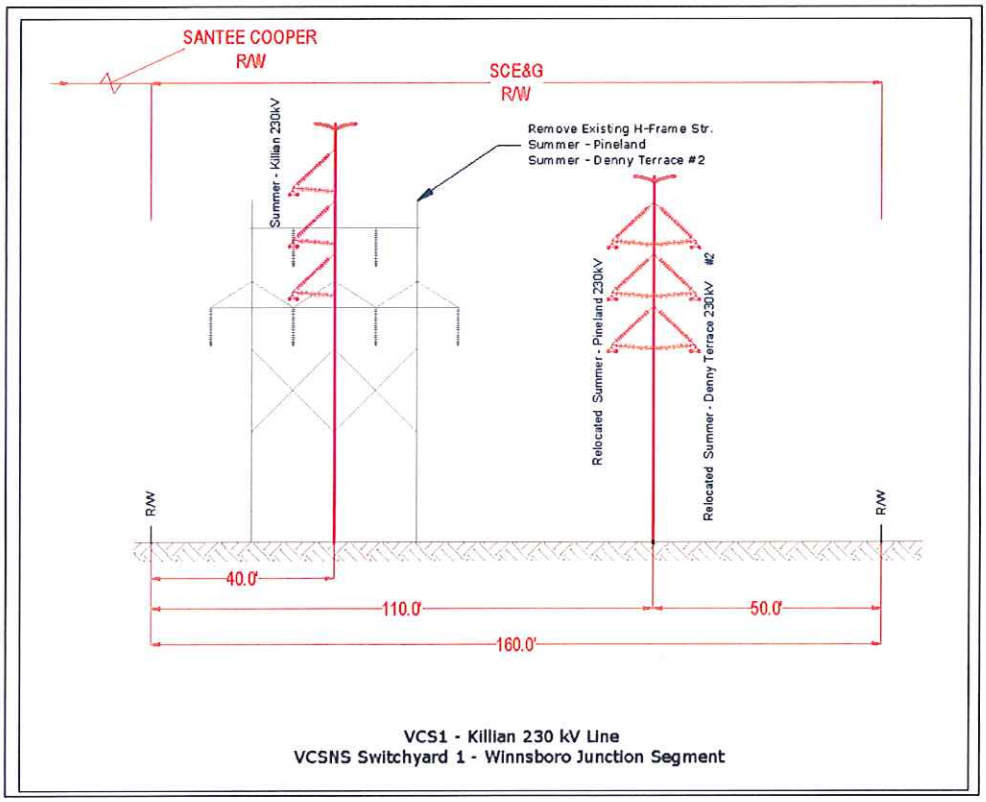


Figure 3.1-1 VCS1-Winnsboro Junction

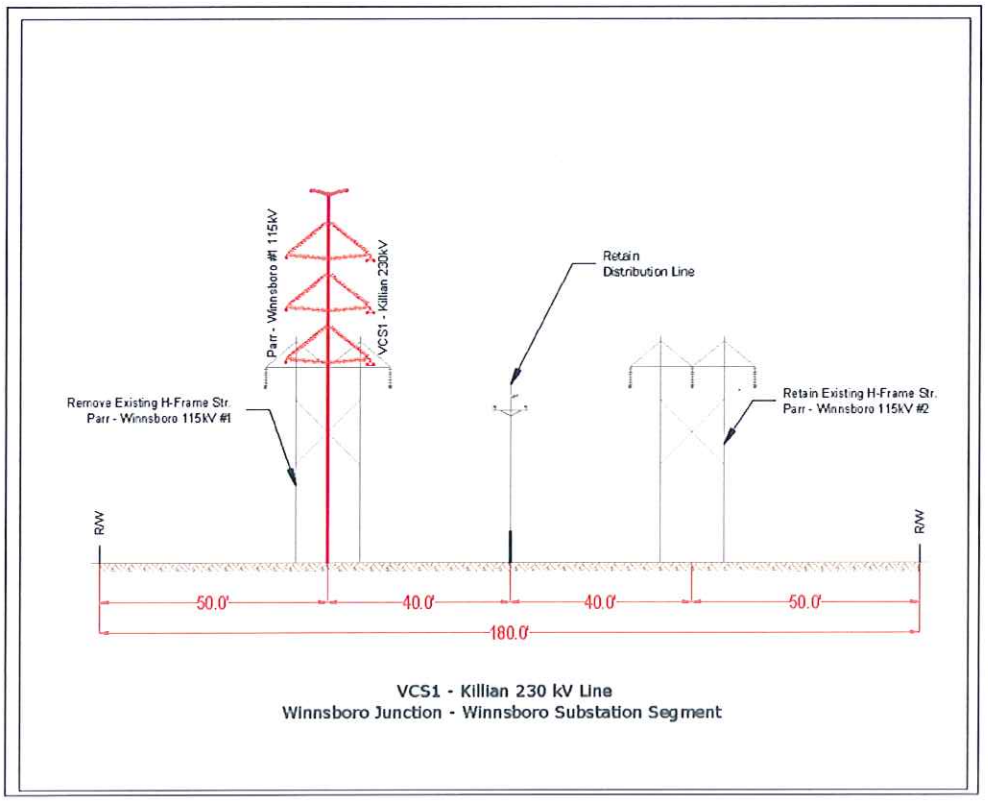


Figure 3.1-2 Winnsboro Junction-Winnsboro Substation

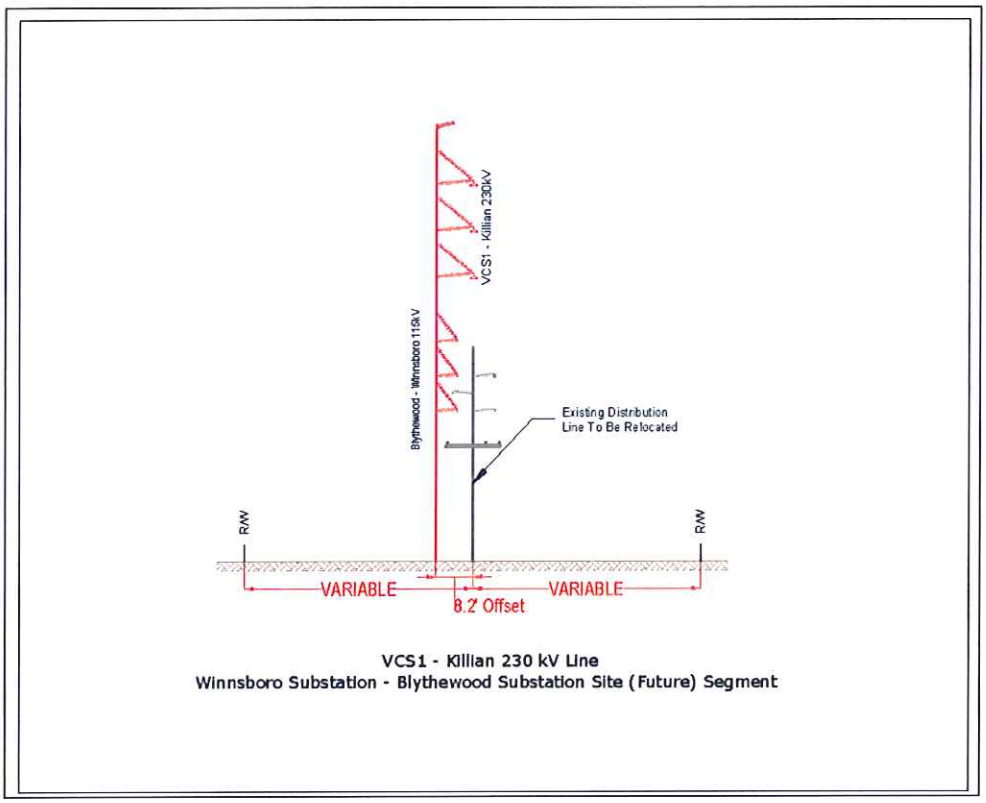


Figure 3.1-3 Winnsboro Substation-Future Blythewood Substation Site

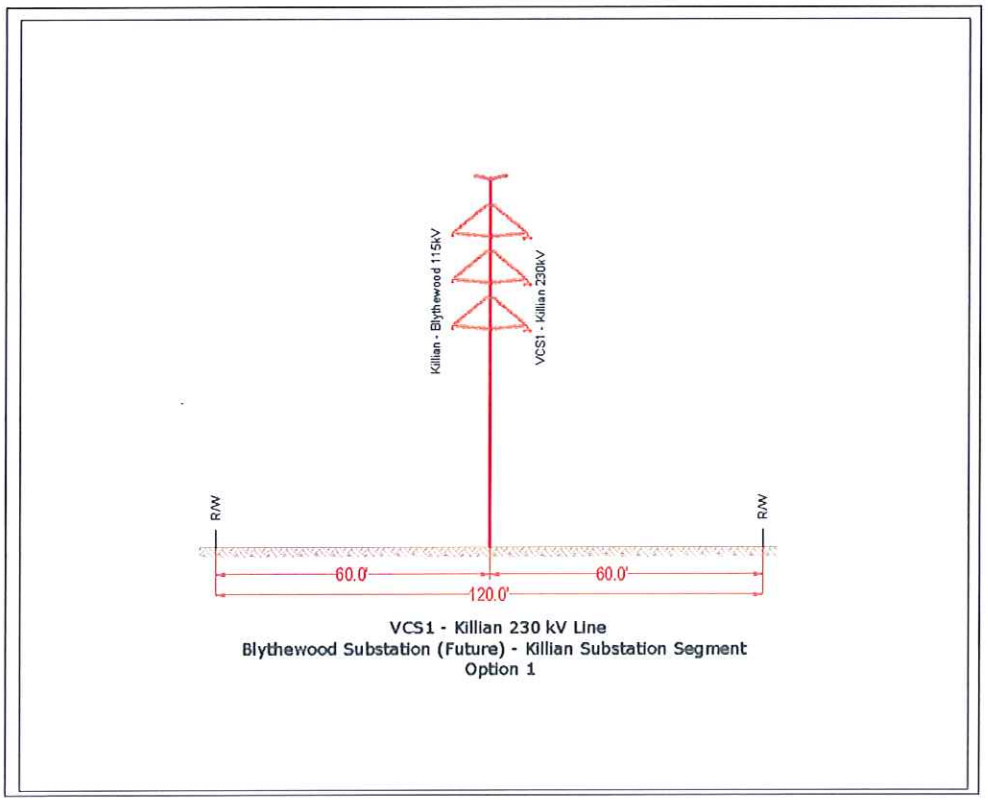


Figure 3.1-4 Future Blythewood Substation Site-Killian Substation
VCS1-Killian 230 kV Line (Option 1)

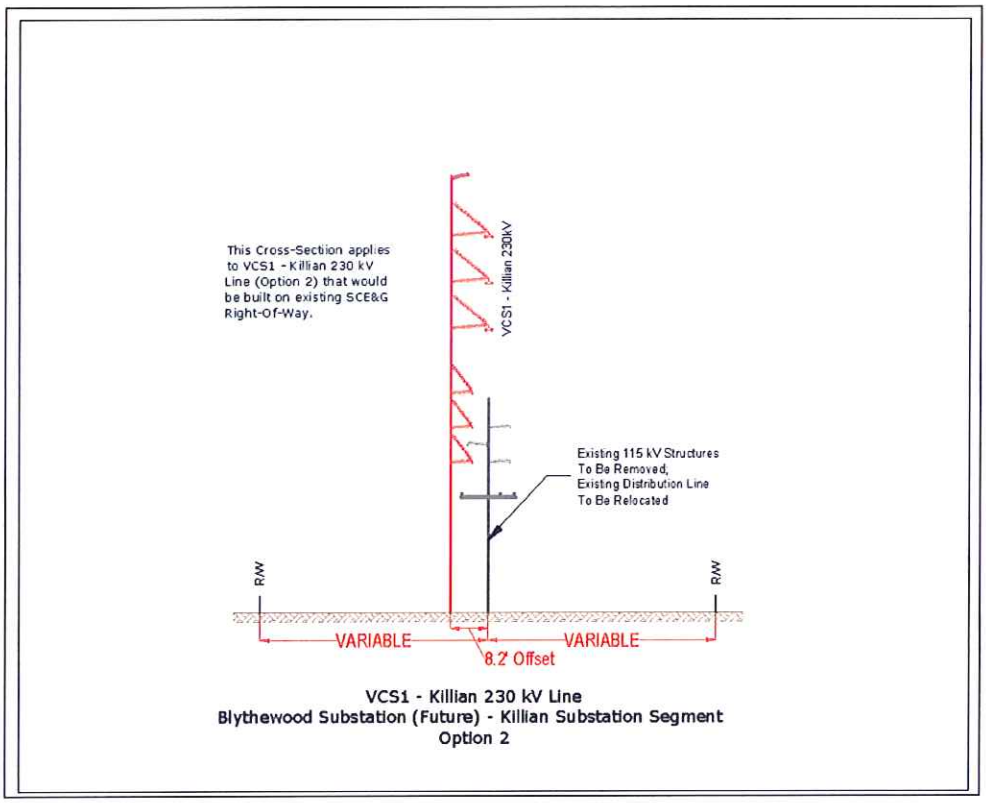


Figure 3.1-5 Future Blythewood Substation Site-Killian Substation
VCS1-Killian 230 kV Line (Option 2)

3.2 Estimated Project Cost

SCE&G completed comprehensive cost estimates for the VCS1-Killian 230 kV Line as shown in Charts 3.2-1 and 3.2-2, below. These two charts show the costs associated with the use of Option 1 or Option 2 for the Blythewood-Killian Segment (Section 2.3). Although Charts 3.2-1 and 3.2-2 reflect a minimal cost difference between the options specific to the VCS1-Killian 230 kV Line, if Option 2 were used for the VCS1-Killian Line, SCE&G would still be required to pursue the new right-of–way presently associated with Option 1 to build a second 115 kV line between the future Blythewood 230/115 kV Substation and the Killian 230/115 kV Substation as discussed in Section 2.3. Chart 3.2-3 displays the estimated cost to run the second 115 kV line on the new right-of–way, which would be an additional cost associated with using Option 2. Thus, when the additional 115 kV line cost associated with Option 2 is considered, Option 1 is estimated to be significantly more economical.

The estimated transmission line costs provided below are inclusive of engineering, materials, removal of existing 115 kV structures and conductor (where applicable), installation of

new structures, new conductor, right-of-way clearing (where applicable), environmental protection, repairs/stabilization of any disturbed areas, and other miscellaneous costs, as applicable.

Chart 3.2-1: Estimated Total Project Cost-VCS1-Killian 230 kV Line (Using Option 1 for the Blythewood-Killian Segment)

Estimated Transmission Line Construction and Right-of-Way Preparation Cost	Estimated New Right-Of-Way Acquisition Costs (Option 1-New ROW)	Total Estimated VCS1-Killian 230 kV Line Cost
$44,700,000	$2,300,000	$47,000,000

Chart 3.2-2: Estimated Total Project Cost-VCS1-Killian 230 kV Line (Using Option 2 for the Blythewood-Killian Segment)

Estimated 230 kV Line Construction Cost	Estimated New Right-of-Way Preparation Cost	Estimated New Right-Of-Way Acquisition Costs	Total Estimated VCS1-Killian 230 kV Line Cost
$46,200,000	N/A	N/A	$46,200,000

Chart 3.2-3: Estimated Total Project Cost for Second 115 kV Line between Blythewood Substation & Killian Substation

Estimated 115 kV Line Construction and Right-of-Way Preparation Cost	Estimated New 115 kV Right-Of-Way Acquisition Costs	Total Estimated New 115 kV Line Cost
$4,800,000	$2,300,000	$7,100,000

4.0 THE AFFECTED ENVIRONMENT

SCE&G compiled information on the affected environment of the area within which the future VCS1-Killian 230 kV Line will be located (*Figure 4.0-1*) by reviewing the published literature, interpreting aerial photography, reviewing agency information, and performing field investigations. A Geographic Information System ("GIS") was used to analyze, model, and manage the data. This process enabled the development of accurate and detailed databases that characterize environmental resources, land use, cultural resources, and scenic conditions of the area surrounding the VCS1-Killian 230 kV Line route, which facilitated an analysis of likely impacts.

4.1 Physiography

South Carolina covers more than 32,000 square miles and is divided into three major physiographic provinces. A small area along the northwestern boundary of the State lies in the Blue Ridge physiographic province. The Piedmont physiographic province occupies the area between the Blue Ridge province and the Fall Line, and the area between the Fall Line and the Atlantic Ocean comprises the Coastal Plain physiographic province. The Coastal Plain province is comprised of three sub-regions: Upper Coastal, Middle Coastal, and Lower Coastal. The Blue Ridge and Piedmont provinces are composed of igneous and metamorphic rocks, mostly gneiss, schist, phyllite, and slate. Elevations are as high as 650 ft. above mean sea level ("msl") at the Fall Line and over 3,500 ft. above msl in the Blue Ridge province. The Coastal Plain province consists of variations of sand, clay, and limestone that overlay the Piedmont rocks. Elevations range from msl at the coast to as much as 650 ft. msl at the Fall Line.

Approximately 29 miles of the approximate 37 mile-long VCS1-Killian 230 kV Line route will reside in the Piedmont province; the southernmost end segment, approximately 8 miles, is located in the Upper Coastal sub-region of Richland County.

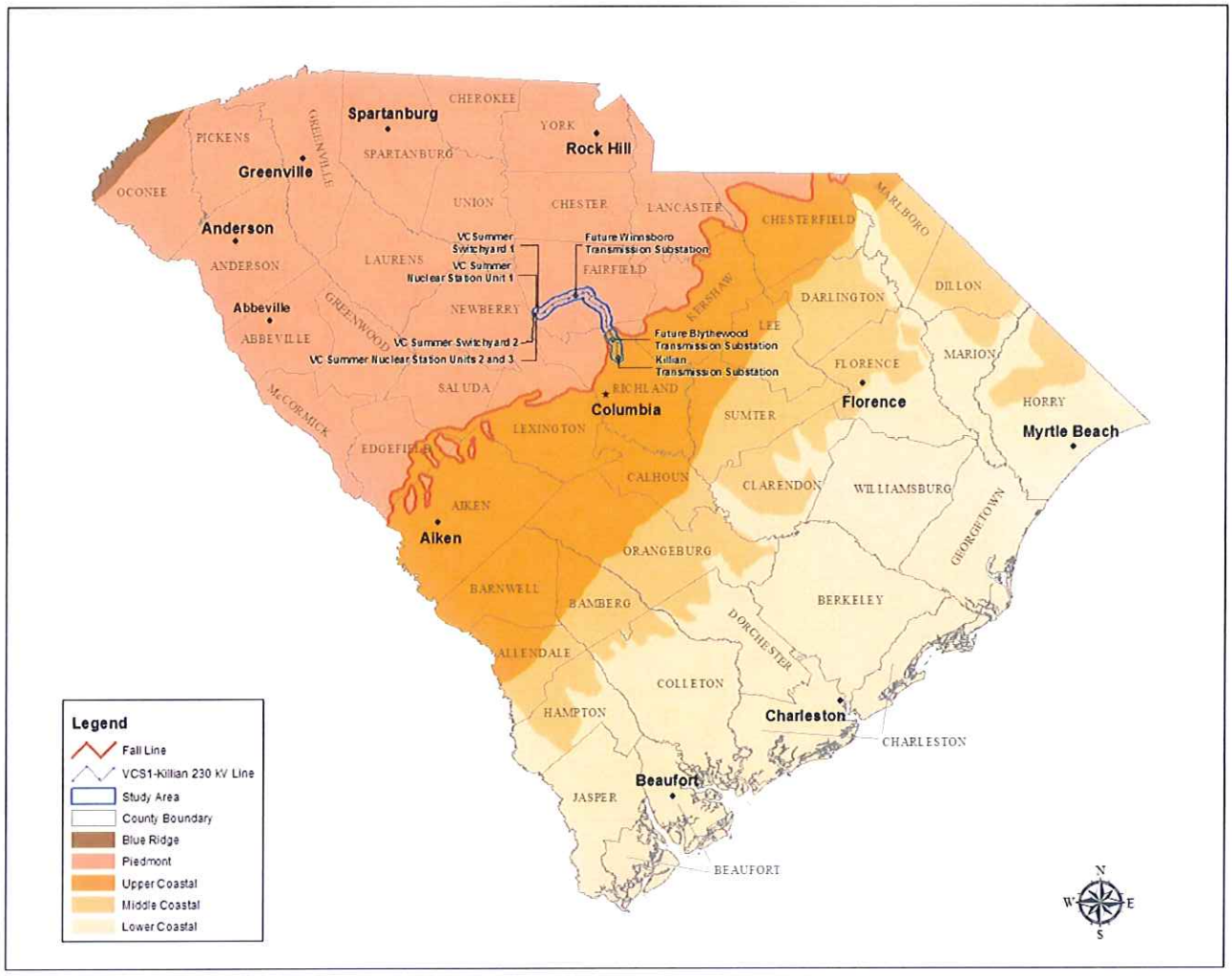


Figure 4.1-1 S.C. Physiographic Regions

4.2 Land Cover

Piedmont Physiographic Region

The rolling uplands of the Piedmont landscape are predominantly a mosaic of agricultural land and managed woodland, with a history of clearing and economic use that dates back to the earliest times of European settlement. Hardwood-dominated forests occupy relatively narrow floodplains and scattered upland sites, while pine and pine-hardwood forests occupy the majority of forested upland sites. To quantify the effects the VCS1-Killian 230 kV Line will have on various land cover types, SCE&G mapped the land cover conditions within 1,000 feet of the proposed centerline of the future VCS1-Killian 230 kV Line.

Included below are descriptions of the major land cover classifications in the Piedmont physiographic region and the fauna that are common to the habitat provided by the classifications.

Oak-hickory Forest

Occurring throughout the state but most characteristic of rolling uplands in the Piedmont, oak-hickory forest is a widely distributed community that varies from site to site. Occurring in highly fragmented stands, later successional stages tend to be made up of a diverse assemblage of hardwoods, primarily oaks and hickories, as co-dominants in combination with pines. Understory, shrub and herbaceous layers are present in varying degrees, represented by diverse woody and non-woody species. Vegetation on most sites consists of early- to mid-successional managed stands of pine and pine-hardwood forest. The understory in pure pine stands is often open, but in mixed or older stands, it is dominated by the hardwoods characteristic of the site. Common pine species of the Piedmont include shortleaf (*Pinus echinata*) and loblolly (*P. taeda*), with the former better adapted to dry, fine textured upland soils and loblolly achieving maximum growth on deep soils with good moisture and drainage.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: American Kestrel, Eastern Wood Pewee, Red-cockaded Woodpecker, Wood Thrush, Pine Snake

High Priority: Pine Woods Snake

Moderate Priority: Scarlet Tanager, Eastern Fox Squirrel

River Bottom Forest

River bottoms, or "bottomland forests", consist of hardwood-dominated woodlands with moist soils that are usually associated with major river floodplains. Characteristic trees include sweetgum (*Liquidambar styraciflua*), loblolly pine (*Pinus taeda*), water oak (*Quercus nigra*), willow oak (*Quercus phellos*), laurel oak (*Quercus laurifolia*), cherrybark oak (*Quercus pagoda*), and American holly (*Ilex opaca*). A subtype dominated by bald cypress (*Taxodium distichium*) and water tupelo (*Nyssa aquatica*) occurs on some lower elevation sites in the southern section on the Piedmont province, but is not as prevalent as in the broader floodplains of the coastal plain. Compared to the coastal plain, the floodplains of major rivers in the Piedmont are confined by topography to relatively narrow corridors.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: Black-throated Green Warbler, Kentucky Warbler, Little Blue Heron, Rusty Blackbird, Swainson's Warbler, Yellow-crowned Night Heron, Black Bear, Northern Yellow Bat

Highest Priority: Acadian Flycatcher, American Alligator, Black Swamp Snake, Gulf Coast Mud Salamander, River Cooter, Spiny Softshell Turtle, Striped Mud Turtle, Mink, Rafinesque's Big-eared Bat, Southeastern Bat, Star-nosed Mole

Moderate Priority: American Woodcock, Great Blue Heron, Great Egret, Louisiana Waterthrush, Wood Duck, Bird-voiced Treefrog, Common Snapping Turtle, Spotted Turtle, Eastern Woodrat, Eastern Fox Squirrel

Piedmont Small Stream Forest

Piedmont small stream forests are distinguished from forest communities on larger floodplains because of differences between the scales of the ecosystems. In smaller floodplains, the levees, sloughs and ridges are largely absent or poorly developed. Flooding regime is also more variable between small watersheds than larger ones. Soils are various alluvial types that are seasonally or intermittently flooded. The forest has an open to dense understory or shrub layer and a sparse to dense herb layer. The canopy has a mixture of bottomland and mesophytic trees including river birch (*Betula nigra*), sycamore (*Platanus occidentalis*), sweetgum (*Liquidambar styraciflua*), tulip tree (*Liriodendron tulipifera*), American elm (*Ulmus americana*), hackberry (*Celtis laevigata*), green ash (*Fraxinus pennsylvanica*), and red maple (*Acer rubrum*).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: Kentucky Warbler, Little Blue Heron, Rusty Blackbird, Wood Thrush, Yellow-crowned Night Heron, Tiger Salamander

High Priority: Acadian Flycatcher, River Cooter, Spiny Softshell Turtle, Yellowbelly Turtle, Mink, Swamp Rabbit

Moderate Priority: Great Blue Heron, Great Egret, Louisiana Waterthrush

Cove Forest

Cove forests are botanically diverse, well-developed hardwood forests occurring on scattered rich and generally small sites that are less than 200 acres. Usually, these forests occur on protected bluffs in association with small stream forests or river bottoms. No single species tends to dominate. Shrub species are usually numerous and the herbaceous flora is fairly rich, with many spring ephemerals. Canopy and understory is composed of hardwoods including beech (*Fagus grandifolia*), tulip tree (*Liriodendron tulipifera*), black gum (*Nyssa sylvatica*), sourwood (*Oxydendrum arboreum*), white oak (*Quercus alba*), northern red oak (*Q. rubra*), black oak (*Q.velutina*), sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), southern sugar maple *saccharum*), basswood (*Tilia heterophylla*), ironwood (*Carpinus caroliniana*), flowering dogwood (*Cornus florida*), American holly (*Ilex opaca)*, witch-hazel (*Hamamelis virginiana),* and hop-hornbeam (*Ostrya virginiana*).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: Eastern Wood Pewee, Kentucky Warbler, Wood Thrush, Webster's Salamander

High Priority: Four-toed Salamander

Moderate Priority: Scarlet Tanager

Grassland and Early Successional Habitats

A variety of open habitats occupies a considerable portion of upland sites in the Piedmont, including agricultural land, recently abandoned farmland, recently cleared land, and a matrix of managed open pine forest and grassland. Golf courses, urban yards and open spaces are also included in this habitat type. The vegetation on most sites is oak-hickory forest, although many sites are maintained in early successional stages.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: Eastern Meadowlark, Field Sparrow, Grasshopper Sparrow, Loggerhead Shrike, Northern Bobwhite, Southern Hognose Snake

High Priority: Barn Owl, Meadow Vole

Moderate Priority: American Woodcock, Bewick's Wren

General Condition of Piedmont Land Cover Types

To a greater degree than in other regions, the vegetation in the Piedmont has been altered by human activity. Cotton agriculture changed much of the original hardwood and shortleaf pine (*Pinus echinata*) forests into fields. Fields eroded, often losing all topsoil. By the 1930's, various factors, including the Great Depression and boll weevil outbreaks as well as severe erosion, led to widespread farmland abandonment in the Piedmont.

Loblolly pine (*Pinus taeda*) was introduced to the Piedmont during the nineteenth century as a cash lumber crop; this pine now dominates much of the region. According to a U.S. Forest Service survey, loblolly-dominated pine forests occupy over two million acres in South Carolina's Piedmont region (Conner and Sheffield 2000). Although loblolly pine plantations are found throughout the region, they are much more prevalent in some areas, in particular the southwestern Piedmont.

Coastal Plain Physiographic Region

Eight major land cover classifications are defined for the coastal plain, of which six are either unique to the region or reach their greatest extent there. The predominant habitat types that most casual observers associate with the coastal plain are 1) grassland and early successional

habitats, 2) pine woodland, and 3) river bottoms. Although the remaining types are less extensive, they provide habitat diversity that is important to a number of animals, especially wetland species. Included below are descriptions of the major land cover classifications in the Coastal Plain physiographic region and the fauna that are common to the habitat provided by the classifications.

Pine Woodland

This classification is used to describe all pine-dominated forests throughout the region, including those occupying a variety of soil moisture characteristics except floodplains. The canopy is dominated by one or several species of pine, generally loblolly pine (*Pinus taeda*), or longleaf (*Pinus palustris*), depending on elevation, soil type and silvicultural history. Dense shrub thickets of hollies (*Ilex* spp.) and wax myrtle (*Morella cerifera*) may be present. Higher elevation pine woodlands have abundant grasses and herbaceous cover, particularly when burning is frequent. Optimal habitat for priority species consists of open stands of longleaf pine, sparse understory and shrub layers, a ground cover of wiregrass (*Aristida* spp.), and diverse herbaceous species. Wet prairie, grass-sedge bog, herb bog or pitcher plant bog, is typically found in the outer coastal plain on flat sites with a high water table and soil that is saturated for at least part of the year. Vegetation consists of a thin canopy of pines, almost always longleaf (*Pinus palustris*), although loblolly and pond pine (*P. serotina*) may also be present. The understory is essentially absent or very scattered. Herbaceous flora is quite rich, consisting of many grasses and sedges. Pine flatwoods intergrades with pine savanna; like pine savanna, it is pine woodland situated on essentially flat or rolling terrain with sandy soil and a high water table. Unlike pine savanna, pine flatwoods features a well-developed subcanopy of several tall shrub species. Pine flatwoods is the principal forest type for much of the outer coastal plain.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: American Kestrel, Bachman's Sparrow, Brown-headed Nuthatch, Henslow's Sparrow, Northern Bobwhite, Red-cockaded Woodpecker, Black Bear, Northern Yellow Bat

High Priority: Eastern Diamondback Rattlesnake, Mimic Glass Lizard, Pine Woods Snake

Moderate Priority: Slender Glass Lizard, Eastern Fox Squirrel, Eastern Woodrat

Sandhill Pine Woodland

Sandhill pine woodland is a variation of pine woodland composed of species adapted to xeric, sandy soils. The type occurs principally in the sandhills but also on sand ridges in the coastal plain. Absent frequent fire, a canopy of longleaf pine and a subcanopy of turkey oak prevail, interspersed with scrub oak species and scrub/shrub cover. Frequent burning leads to development of longleaf pine-wiregrass communities.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: American Kestrel, Bachman's Sparrow, Brown-headed Nuthatch, Eastern Wood Pewee, Northern Bobwhite, Red-cockaded Woodpecker, Wood Thrush, Coral Snake, Gopher Tortoise, Pine Snake, Southern Hognose Snake

High Priority: Pine Woods Snake

Moderate Priority: Eastern woodrat, Eastern Fox Squirrel

Upland Forest

Vegetation composition of upland forest is similar to that of oak-hickory forest in the Piedmont, where it is a major vegetation type. Upland forest is rare in the coastal plain, typically occurring on fire-suppressed upland slopes near river floodplains or between rivers and tributaries. It intergrades with river slope communities. Representative canopy trees include white oak (*Quercus alba*), black oak (*Quercus velutina*), post oak (*Quercus stellata*), mockernut hickory (*Carya tomentosa*), pignut hickory (*Carya glabra*), loblolly pine (*Pinus taeda*), flowering dogwood (*Cornus florida*), and black gum (*Nyssa sylvatica*).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: Eastern Wood Pewee, Kentucky Warbler, Rusty Blackbird, Swainson's Warbler, Swallow-tailed Kite, Wood Thrush, Worm-eating Warbler, Chamberlain's Dwarf Salamander, Black Bear, Northern Yellow Bat

High Priority: Acadian Flycatcher, Bald Eagle, Southeastern Bat, Star-nosed Mole

Moderate Priority: Louisiana Waterthrush, Eastern Woodrat, Eastern Fox Squirrel, Southern Dusky Salamander

Grassland and Early Successional Habitats

A variety of open-land habitats occupy a considerable portion of upland sites in the Piedmont, sandhills and coastal plain, including agricultural land, recently abandoned farmland, recently cleared land, and a matrix of managed open pine forest and grassland. Golf courses, urban yards and open spaces are also included in this habitat type. Potential vegetation on most sites is pine woodland and oak-hickory forest, although many sites are maintained in early successional stages. Agricultural lands with surrounding forest edge habitat occur widely throughout the region and represent the prevailing cover type in the "agriculture belt" that composes most of the inner coastal plain.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: Common Ground-dove, Eastern Meadowlark, Field Sparrow, Grasshopper Sparrow, Loggerhead Shrike, Northern Bobwhite, Painted Bunting

High Priority: Barn Owl

Moderate Priority: American Woodcock, Bewick's Wren, Meadow Vole, Eastern Woodrat

Ponds and Depressions

Topographic depressions in the coastal plain support a variety of permanently and semi-permanently flooded isolated freshwater wetlands that have open or closed canopy forest cover. Vegetation cover varies with hydrology, substrate and fire frequency. Depression meadows, pond cypress ponds, swamp tupelo ponds, pocosins and limestone sinks are also included in this habitat type. Landforms include natural and artificial ponds dominated by cypress and/or swamp tupelo, limestone sinks, and Carolina bays. Shrub-dominated pocosins or grass-sedge-herb dominated depression meadows occur on peat- or clay-based substrates, typically in Carolina bays. Absent fire, vegetation in most of these habitats reverts to mixed floodplain hardwood and cypress-tupelo dominated forest. Upslope from these lowland habitats, the transition to well drained uplands supporting pine woodland is often abrupt.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: Little Blue Heron, Yellow-crowned Night-Heron, Flatwoods Salamander, Tiger Salamander, Carolina Gopher Frog, Broad-striped Dwarf Siren, Chamberlain's Dwarf Salamander

High Priority: Black Swamp Snake, Chicken Turtle, Florida Cooter, Florida Green Watersnake, Florida Softshell Turtle, Gulf Coast Mud Salamander, Yellowbelly Turtle, Upland Chorus Frog, Mink, Southeastern Bat

Moderate Priority: Great Blue Heron, Great Egret, Common Snapping Turtle, Spotted Turtle, Southern Dusky Salamander, Northern Cricket Frog

Hardwood Slopes and Stream Bottoms

A complex of hardwood and hardwood-pine communities occupy the floodplains of small streams, mesic bluffs and infrequently flooded flats in association with streams or rivers. Fire is infrequent, due either to the sheltered locations of these communities on bluffs or their isolation within a floodplain. Several mixed mesophytic subtypes characterized by the presence of American beech *(Fagus grandifolia)* occur in sheltered sites with moist soils, particularly on north-facing river bluffs and on slopes of drains and creeks. On upland flats within floodplains (hammocks), southern magnolia *(Magnolia grandiflora)* frequently shares dominance with American beech. The calcareous cliff and marl forest subtype occurs on circumneutral soils derived from limestone or unconsolidated calcareous substrates such as marl. Forest structure of all subtypes is diverse, with understory, shrub and herbaceous species varying according to soil moisture and chemistry. All subtypes intergrade with blackwater stream forest or river bottom forest on lowland sides and with upland forest on upland sides.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: Black-throated Green Warbler, Eastern Wood Pewee, Kentucky Warbler, Rusty Blackbird, Swainson's Warbler, Swallow-tailed Kite, Wood Thrush, Worm-eating Warbler, Chamberlain's Dwarf Salamander, Black Bear, Northern Yellow Bat

High Priority: Acadian Flycatcher, Bald Eagle, Southeastern Bat, Star-nosed Mole

Moderate Priority: Louisiana Waterthrush, Eastern Woodrat, Eastern Fox Squirrel, Southern Dusky Salamander

Blackwater Stream Systems

Tributary streams rising in the sandhills and coastal plain are commonly known as "blackwater streams" for the color of tannins leaching from decaying vegetation. Forests on the narrow floodplains formed by these streams typically have a canopy dominated by swamp tupelo *(Nyssa biflora)* and red maple *(Acer rubrum)*. On broader sites, bald cypress *(Taxodium distichum)* can become an important canopy species. Tulip poplar *(Liriodendron tulipifera)*, sweet gum *(Liquidambar styraciflua)*, pond pine *(Pinus serotina)*, loblolly pine *(Pinus taeda*), and laurel oak *(Quercus laurifolia)* are important associates. The shrub layer is open in areas subjected to the most flooding, or it can be fairly dense and pocosin-like in areas subject to infrequent flooding. Headwaters and wet flats immediately above the floodplain can support dense, pocosin-like shrub thickets or, under suitable fire conditions, pure stands of Atlantic white cedar (*Chamaecyperus thyoides*).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: Kentucky Warbler, Eastern Wood Pewee, Rusty Blackbird, Swainson's Warbler, Wood Thrush, Yellow-crowned Night Heron

High Priority: Acadian Flycatcher, Black Swamp Snake, Spiny Softshell Turtle, Mink, Rafinesque's Big-eared Bat, Southeastern Bat

Moderate Priority: American Woodcock, Louisiana Waterthrush, Wood Duck, Spotted Turtle

River Bottoms

River bottoms, or "bottomland forests", consist of hardwood-dominated woodlands with moist soils that are usually associated with the broad floodplains of major rivers rising in the Piedmont or Blue Ridge. Locally, the floodplains of major coastal plain rivers are significant components of the landscape. Characteristic trees include sweetgum (*Liquidambar styraciflua*), loblolly pine (*Pinus taeda*), water oak (*Quercus nigra*), willow oak (*Quercus phellos*), laurel oak (*Quercus laurifolia*), cherrybark oak (*Quercus pagoda*), and American holly (*Ilex opaca*). A subtype dominated by bald cypress (*Taxodium distichium*) and water tupelo (*Nyssa aquatica*) occurs on lower elevation sites interspersed and intergrading with oak-dominated woodlands. Dominant trees are bald cypress (*Taxodium distichium*) and water tupelo (*Nyssa aquatica*), swamp gum

(*Nyssa biflora*), Carolina ash (*Fraxinus caroliniana*), water elm (*Planera aquatica*), and red maple (*Acer rubrum*).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority: Black-throated Green Warbler, Kentucky Warbler, Little Blue Heron, Rusty Blackbird, Swainson's Warbler, Yellow-crowned Night Heron, Black Bear, Northern Yellow Bat

High Priority: Acadian Flycatcher, American Alligator, Black Swamp Snake, Gulf Coast Mud Salamander, River Cooter, Spiny Softshell Turtle, Striped Mud Turtle, Mink, Rafinesque's Big-eared Bat, Southeastern Bat, Star-nosed Mole

Moderate Priority: American Woodcock, Great Blue Heron, Great Egret, Louisiana Waterthrush, Wood Duck, Bird-voiced Treefrog, Common Snapping Turtle, Spotted Turtle, Eastern Woodrat, Eastern Fox Squirrel

General Condition Floodplain Land Cover Types

The coastal plain has been predominantly used for agricultural purposes since settlement by Europeans in the 18th century. Uplands and the better-drained terraces were cleared for fields at the same time that extensive longleaf pine and swamp hardwood forests on mesic and wet sites were cleared to supply timber. Several cycles of short-rotation pine forest were favored, along with agricultural practices that often provided substantial edge habitat for game species such as quail, but also deep woods or swamp habitat for deer, turkey and waterfowl. By the late 20th century, economic conditions began to favor consolidation of land into larger holdings and the practice of clean field agriculture, along with shorter rotations of both upland and lowland timber. Several large public land holdings and privately held lands or conservation easements are distributed within the coastal plain, covering approximately 5 percent of the region's land area. By far, the largest is the Francis Marion National Forest near the coast. Most public lands in the region have a strong wildlife management focus, including emphasis on threatened and endangered species and other species of concern; for planning purposes the lands are considered protected.

Land cover types and quantities within 1,000 feet of the VCS1-Killian 230 kV Line are presented in Chart 4.2-1.

Chart 4.2-1 Land Cover Classifications and Quantities within 1,000' of the VCS1-Killian 230 kV Line

	Acres
VCS1-Killian 230 kV Line (Option 1)	
Barren	15.4
Cropland	2.6
Grass/Pasture	1567.1
Hardwood Forest	1115.3
Mixed Hardwood/Pine Forest	1985.5
Pine Forest	1684.5
Riparian Vegetation	0.0
Scrub/Shrub	1193.2
Urban/Built-up	1346.2
Water	60.6
Wetland	86.3
VCS1-Killian 230 kV Line (Option 2)	
Barren	10.6
Cropland	2.6
Grass/Pasture	1535.8
Hardwood Forest	1054.1
Mixed Hardwood/Pine Forest	1959.0
Pine Forest	1639.5
Riparian Vegetation	0.0
Scrub/Shrub	1172.3
Urban/Built-up	1520.1
Water	74.4
Wetland	56.6

The vast majority of land cover type found in the existing cleared right-of-way the VCS1-Killian Line will be built within is categorized as "Scrub/Shrub". This classification is comprised, primarily, of grasses and upland early succession plant communities. SCE&G rights-of-way have been maintained in early succession community conditions and/or grasses to protect the integrity of the existing transmission lines. This community is a dominant type, and is primarily composed of herbaceous species, with few pine and hardwood seedlings. Dominant species include blackberry, goldenrod, goldenaster, Canadian horseweed, dog fennel, late flowering thoroughwort, broomsedge bluestem, Vasey's grass, yellow crownbeard, sortbeard plumegrass, rabbit tobacco, hogwort (*Croton capitatus*), Small's ragwort (*Packera anonyma*), forked bluecurls (*Trichostema dichotomum*), calico aster, sericea (*Lespedeza cuneata*), purple top (*Tridens flavus*), fescue (*Festuca* spp.), orangegrass, and hyssopleaf thoroughwort (*Eupatorium hyssopifolium*), all of which are relatively common in utility rights-of-way in the Piedmont province of South Carolina.

4.3 Surface Water Hydrology

The VCS1-Killian 230 kV Line route is located in the Lower Broad River and Wateree River drainage basins. A small portion of the area crossed by the line near Winnsboro drains northwesterly into Lake Wateree. The major tributaries draining to Lake Wateree, all in Fairfield County, are Little Wateree Creek and Dutchmans Creek. Associated secondary tributaries are McCulley Creek and Horse Creek (Little Wateree Creek drainage). In Richland County, the line crosses Rice Creek that flows into Twenty-Five Mile Creek, which flows into the Wateree River south of Lake Wateree.

The remaining areas crossed by the VCS1-Killian 230 kV Line route drain to the southeast into the Broad River. Major waterways in the Broad River drainage basin in Fairfield County in the vicinity of the line route include the Little River and its tributaries, Mill Creek, and Jackson Creek. Jackson Creek tributaries include Winnsboro Branch and Sand Creek. Little Cedar Creek is in Fairfield County and Big Cedar Creek begins in Fairfield County, flows through Richland County, and includes its tributary, Center Creek. Other drainages in Richland County include Crane Creek and its tributaries Roberts Branch, Beasley Creek and Robertson Branch.

The major drainages crossed by the VCS1-Killian 230 kV Line route include Little River, Sand Creek, Big Cedar Creek, Center Creek and Crane Creek. These waters are all classified by the South Carolina Department of Health and Environmental Control ("SCDHEC") as "freshwaters (FW)", which are defined as "suitable for primary and secondary contact recreation, a source for drinking water after conventional treatment in accordance with the requirements of SCDHEC, suitable for fishing and the survival and propagation of a balanced indigenous aquatic community of fauna and flora, and suitable for industrial and agricultural uses". Stream water quality in the immediate vicinity of the line route is generally good, and small ponds are common occurrences in the rural areas the line route runs through.

Precipitation is the basic source of water resources in Fairfield and Richland Counties, South Carolina. Normally, wet and dry years seem to alternate; however, some periods of several dry years occur. Droughts have occurred in the region in 1954-55, 1986, 1996, and 1998-2002. The historical average annual precipitation for Fairfield County is 45.84 inches; Richland is 46.87 inches. Annual Precipitation is fairly well distributed throughout in the region, with midsummer being the wettest, historically, and fall the driest. The period from April to September, which is the span of the growing season, receives an average of about 67 percent of the annual precipitation total (USDA 1980). Measurable snowfall in the area occurs infrequently.

Through a review of the National Wetland Inventory mapping, field inspections, and comprehensive "desktop" wetland delineations based on hydrographic data, land cover and topography, it was determined that 31 acres of wetlands reside in the VCS1-Killian 230 kV right-of-way.

4.4 Wildlife

Land use and natural plant communities strongly influence wildlife diversity within South Carolina. In the Piedmont province and Upper Coastal sub-province, bottomland forests offer habitat for white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), and wild turkey (*Meleagris gallopavo*). Other representative species in this area include the gray squirrel (*Sciurus carolinensis*), gray fox (*Urocyon cinereoargenteus*), opossum (*Didelphis virginiana*), prothonotary warbler (*Protonotaria citrea*), Carolina wren *(Thryothorus ludovicianus*), Carolina chickadee (*Poecile carolinensis*), red-shouldered hawk (*Buteo lineatus*), parula warbler (*Parula americana*), green frog (*Rana clamitans*), bird-voiced tree frog (*Hyla avivoca*), box turtle (*Terrapene carolina*), and black racer (*Coluber constrictor*).

The pine forests provide habitat that supports the eastern diamondback rattlesnake (*Crotalus adamanteus*), green anole (*Anolis carolinensis*), northern cardinal (*Cardinalis cardinalis*), bobwhite quail (*Colinus virginianus*), and eastern fox squirrel *(S. niger*). Other representative species found in the forested areas in the vicinity of the VCS1-Killian 230 kV Line route include the white-tailed deer, cottontail rabbit (*Sylvilagus floridanus*), wild turkey, red-tailed hawk (*Buteo jamaicensis*), pine warbler (*Dendroica pinus*), eastern towhee (*Pipilo erythrophthalmus*), pine snake (*Pituophis melanoleucus*), oak toad (*Bufo quercicus*), and flatwoods salamander (*Ambystoma cingulatum*).

Common in recent clear-cut areas in the vicinity of the VCS1-Killian 230 kV Line route are scrub/shrub communities (early succession) and regenerating hardwoods such as sapling scrub oaks, hickory and red maple. The representative species found in these areas include the eastern garter snake (*Thamnophis sirtalis*), rough green snake (*Opheodrys aestivus*), red-tailed hawk, Carolina wren, northern mockingbird (*Mimus polyglottos*), yellow-breasted chat (*Icteria virens*), eastern cottontail, golden mouse (*Peromyscus nuttalli*), and white-tailed deer.

4.5 Fisheries

Most of the area's perennial streams are typical of South Carolina's lower piedmont / upper coastal plain freshwater streams where an abundance of finfish and mussels can be found. The major waters of the region include Broad River, Little River, Wateree River, Sand Creek, Big Cedar Creek, Center Creek and Crane Creek. Species supported in these systems include largemouth bass (*Micropterus salmoides*), catfish (*Ictalurus* spp.), and several sunfish species (*Lepomis* spp.). Other waters in the area are represented by non-game species such as the rosyside dace (*Clinostomus funduloides*), yellowfin shiner (*Notropis lutipinnis*), and the creek chub (*Semotilus atromaculatus*).

Farm ponds found throughout the region offer opportunities to fish for largemouth bass (*Micropterus salmoides*), sunfish (*Lepomis* spp.), and catfish (*Ictalurus* spp.).

4.6 Rare, Threatened and Endangered Species

Records of the United States Fish and Wildlife Service ("USFWS") and South Carolina Heritage Trust Program were reviewed to determine listed rare, threatened and endangered ("RTE") species that could potentially be affected by construction of the VCS1-Killian 230 kV Line. Charts 4.6-1 and 4.6-2, below, show the RTE species for Richland and Fairfield Counties, South Carolina, respectively, that are included on the USFWS lists. Charts 4.6-3 and 4.6-4 are the S.C. Heritage Trust Program lists for the two counties.

Chart 4.6-1: Richland County – U.S. Fish and Wildlife Service List

Listed Species in Richland County				
Species	**Federal Status**	**State Status**	**Habitat**	**Threats**
Birds				
Bald eagle *Haliaeetus leucocephalus*	BGEPA	BGEPA	coastlines, rivers, large lakes or streams which provide adequate feeding grounds; typically nest in SC between late October and late May; tend to return year after year to the same nest tree, once they have successfully established a nest	human activities that can cause them to abandon nest, or to not properly incubate eggs, or care for young
Red-cockaded woodpecker *Picoides borealis*	E	E	nest in mature pine with low understory vegetation (<1.5m); forage in pine and pine hardwood stands > 30 years of age, preferably > 10" dbh	reduction of older age pine stands and to encroachment of hardwood midstory in older age pine stands due to fire suppression
Wood stork *Mycteria americana*	E	E	primarily feed in fresh and brackish wetlands and nest in cypress or other wooded swamps	decline due primarily to loss of suitable feeding habitat; other factors include loss of nesting habitat, prolonged drought/flooding, raccoon predation on nests, and human disturbance of rookeries
Fishes				
Shortnose sturgeon *Acipenser brevirostrum*	E	E	occur in most major river systems along the eastern seaboard	habitat alterations from discharges, dredging or disposal of material into rivers, or related development activities involving estuarine/riverine mudflats and marshes; commercial exploitation up until the 1950s
Plants				
Smooth coneflower *Echinacea laevigata*	E	E	prairie remnants, open woods, cedar barrens, roadsides, clearcuts, dry limestone bluffs, and power line rights-of-way, usually on magnesium and calcium rich soils	collection, fire suppression, exotic weeds
Rough-leaved loosestrife *Lysimachia asperulaefolia*	E	E	in the sandhills of the Carolinas in ecotones or edges between longleaf pine uplands and pond pine pocosins, on moist to seasonally saturated sands and on shallow organic soils overlaying sand	fire suppression, drainage, siltation from erosion, and, to a lesser extent, residential and industrial development

Chart 4.6-2: Fairfield County – U.S. Fish and Wildlife Service List

Listed Species in Fairfield County				
Species	**Federal Status**	**State Status**	**Habitat**	**Threats**
Birds				
Bald eagle *Haliaeetus leucocephalus*	BGEPA	BGEPA	coastlines, rivers, large lakes or streams which provide adequate feeding grounds; typically nest in SC between late October and late May; tend to return year after year to the same nest tree, once they have successfully established a nest	human activities that can cause them to abandon nest, or to not properly incubate eggs, or care for young

Chart 4.6-3: S.C. Heritage Trust Program List for Richland County, S.C.

August 24, 2009

Scientific Name	Common Name	USESA Designation	State Protection	Global Rank	State Rank
Vertebrate Animals					
Condylura cristata	Star-nosed Mole			G5	S3?
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat		SE-Endangered	G3 G4	S2?
Etheostoma collis	Carolina Darter		ST-Threatened	G3	SNR
Fundulus diaphanous	Banded Killifish			G5	S1
Haliaeetus leucocephalus	Bald Eagle		SE-Endangered	G5	S2
Heterodon simus	Southern Hognose Snake			G2	SNR
Hyla andersonii	Pine Barrens Treefrog		ST-Threatened	G4	S2 S3
Notropis chiliticus	Redlip Shiner			G4	S1?
Picoides borealis	Red-cockaded Woodpecker	LE: Listed endangered	SE-Endangered	G3	S2
Rhinichthys atratulus	Blacknose Dace			G5	S1
Sciurus niger	Eastern Fox Squirrel			G5	S4
Spilogale putorius	Eastern Spotted Skunk			G5	S4
Sylvilagus aquaticus	Swamp Rabbit			G5	S2 S3
Tyto alba	Barn-owl			G5	S4
Ursus americanus	Black Bear			G5	S3?
Invertebrate Animals					
Elimia catenaria	Gravel Elimia			G4	SNR
Pyganodon cataracta	Eastern Floater			G5	SNR
Strophitus undulates	Creeper			G5	S2
Villosa delumbis	Eastern Creekshell			G4	S4
Vascular Plants					
Agalinis tenella				G4Q	SNR
Andropogon perangustatus	Narrow Leaved Bluestem			G4Q	S1
Aristida condensate	Piedmont Three-awned Grass			G4?	S2
Aster elliottii	Elliott's Aster			G4	S3
Astragalus michauxii	*Sandhills Milkvetch*			G3	S3
Balduina atropurpurea	Purple Balduina			G2	S1
Botrychium lunarioides	Winter Grape-fern			G4?	S1
Calamovilfa brevipilis	Pine-barrens Reed-grass			G4	S1
Carex cherokeensis	Cherokee Sedge			G4 G5	S2
Carex collinsii	Collins' Sedge			G4	S2
Carex crus-corvi	Ravenfoot Sedge			G5	S2
Carex eliottii	Elliott's Sedge			G4?	S1
Carex socialix	Social Sedge			G4	S1
Cayaponia quinqueloba	Cayaponia			G4	S1?
Collinsonia serotina	Southern Horse-balm			G3 G4	S1
Coreopsis gladiata	Southeastern Tickseed			G4 G5	SNR
Dryopteris carthusiana	Spinulose Shield Fern			G5	S1
Echniacea laevigata	Smooth Coneflower	LE: Listed endangered		G2 G3	S3
Eleocharis robbinsii	Robbins Spikerush			G4 G5	S2
Hymenocallis coronaria	Shoals Spider-lily			G2Q	S2
Hypericum adpressum	Creeping St. John's-wort			G3	S2
Hypericum nitidum	Carolina St. John's-wort			G4	S1
Ile amelanchier	Sarvis Holly			G4	S3
Ipomopsis rubra	Red Standing-cypress			G4 G5	S2
Juncus abortivus	Pinebarren Rush			G4 G5	SNR
Lechea torreyi	Piedmont Pinweed			G4	SNR
Liatris microcephala	Small-head Gayfeather			G3 G4	S1

Richland County (Continued) Scientific Name	Common Name	USESA Designation	State Protection	Global Rank	State Rank
Lindera subcoriacea	Bog Spicebush			G2 G3	S3
Lobelia sp. *1*	Lobelia			G3	SNR
Ludwigia spathulata	Spatulate Seedbox			G2 G3	S3
Lycopus cokeri	Carolina Bugleweed			G3	S2
Vascular Plants (cont.)					
Lysimachia asperulifolia	Rough-leaved Loosestrife	LE: Listed endangered		G3	S1
Macbridea caroliniana	Carolina Bird-in-a-nest			G2 G3	S3
Magnolia macrophylla	Bigleaf Magnolia			G5	S1
Magnolia pyramidata	Pyramid Magnolia			G4	S1
Myriophyllum laxum	Piedmont Water-milfoil			G3	S2
Nestronia umbellula	Nestronia			G4	S3
Ophioglossum vulgatum	Adder's-tongue			G5	S2
Oxypolis canbyi	Canby's Dropwort	LE: Listed endangered		G2	S2
Paspalum bifidum	Bead-grass			G5	S2
Pityopsis pinifolia	Pine-leaved Golden Aster			G4	S2
Platanthera lacera	Green-fringe Orchis			G5	S2
Potamogeton confervoides	Algae-like Pondweed			G4	S1
Prunus alabamensis	Alabama Black Cherry			G4	S1
Psilotum nudum	Whisk Fern			G5	S1
Pteroglossaspis ecristata	Crestless Plume Orchid			G2 G3	S2
Quercus oglethorpensis	Oglethorpe's Oak			G3	S3
Rhexia aristosa	Awned Meadowbeauty			G3	S3
Rhododendron eastmanii	May White			G2	S1
Rhynchospora inundata	Drowned Hornedrush			G4?	S2?
Rhynchospora macra	Beak Rush			G3	S1
Rhynchospora oligantha	Few-flowered Beaked-rush			G4	S2
Rhynchospora pallida	Pale Beakrush			G3	S1
Rhychospora stenophylla	Chapman Beakrush			G4	S2
Sarracenia rubra	Sweet Pitcher-plant			G4	S4
Scirpus etuberculatus	Canby Bulrush			G3 G4	SNR
Tofieldia glabra	White False-asphodel			G4	S1 S2
Trepocarpus aethusae	Aethusa-like Trepocarpus			G4 G5	S1
Tridens chapmanii	Chapman's Redtop			G3 G5	S1
Urtica chamaedryoides	Weak Nettle			G4 G5	S2
Vaccinium crassifolium ssp. *semperviren*	Rayner's Blueberry			G4 G5T1	S1
Warea cuneifolia	Nuttall Warea			G4	S1
Nonvascular Plant					
Plagiochila sullivantii				G2	SNR
Animal Assemblage					
Waterbird Colony				GNR	SNR

Richland County (Continued) Scientific Name	Common Name	USESA Designation	State Protection	Global Rank	State Rank
Communities					
Atlantic white cedar swamp				G2	S2
Bald cypress–tupelo gum swamp				G5	S4
Carolina bay				GNR	SNR
Mesic mixed hardwood forest				G5	S4
Nyssa aquatica–nyssa biflora forest	Water Tupelo–Swamp Blackgum Swamp Forest			G4 G5	SNR
Nyssa biflora–(acer rubrum) / ilex opaca / leucothoe axillaris / carex atlantica ssp. capillacea forest	Swamp Blackgum Floodplain Seepage Forest			G2 G3	SNR
Oak – hickory forest				G5	S5
Pine savanna				G3	S2
Pinus palustris–pinus (echinata, taeda) quercus (incana, margarettiae, falcate, laevis) woodland	Longleaf Pine–(Shortleaf Pine, Loblolly Pine)–Bluejack Oak, Sand Post Oak, Southern Red Oak, Turkey Oak) Forest	LE: Listed endangered		G3?	SNR
Pinus serotina–(Liriodendron tulipifera) / lyonia lucida–clethra alnifolia–ilex glabra woodland	Pond Pine–(Tuliptree) / Shining Fetterbush–Coastal Sweet-pepperbush–Little Gallberry Woodland			GNR	SNR
Pinus serotina / arundinaria gigantean ssp. tecta woodland				G1	SNR
Pond cypress pond				G4	S4
Quercus alba–carya alba / euonymus Americana / hexastylis arifolia forest	Mesic Subacid Southern Piedmont Oak–Hickory Forest			G5?	SNR
Rhododendron thicket				G5	S5
Streamhead pocosin				G4	S4
Xeric sandhill scrub				G5	S3

See Legend for Heritage Trust Program List at the bottom of Chart 4.6-4

Chart 4.6-4: S.C. Heritage Trust Program List for Fairfield County, S.C.

April 15, 2010

Scientific Name	Common Name	USESA Designation	State Protection	Global Rank	State Rank
Vertebrate Animals					
Etheostoma collis	Carolina Darter		SE-Endangered	G3	SNR
Haliaeetus leucocephalus	Bald Eagle		SE-Endangered	G5	S2
Sciurus niger	Eastern Fox Squirrel			G5	S4
Invertebrate Animals					
Villosa delumbis	Eastern Creekshell			G4	S4
Animal Assemblage					
Waterbird Colony				GNR	SNR
Vascular Plants					
Aster georgianus	Georgia Aster	C: Candidate		G2 G3	SNR

Fairfield County (continued)					
Carex oligocarpa	Eastern Few-fruit Sedge			G4	SNR
Dirca palustris	Eastern Leatherwood			G4	S2
Dodecatheon meadia	Shooting-star			G5	S1?
Frasera caroliniensis	Columbo			G5	S2
Isoetes piedmontana	Piedmont Quillwort			G3	S2
Minuartia uniflora	One-flower Stitchwort			G4	S3
Ophioglossum vulgatum	Adder's-tongue			G5	S2
Osmorhiza claytonii	Hairy Sweet-cicely			G5	S2
Philadelphus hirsutus	Streambank Mock-orange			G5	S2
Rhododendron eastmanii	May White			G2	S2
Scutellaria parvula	Small Skullcap			G4	S2 S3
Sedum pusillum	Granite Rock Stonecrop			G3	S2
Communities					
Mesic mixed hardwood forest				G5	S4
Oak- hickory forest				G5	S5

Legend

G1	Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction
G2	Imperiled globally because of rarity or factor(s) making it vulnerable
G3	Either very rare throughout its range or found locally in a restricted range, or having factors making it vulnerable
G4	Apparently secure globally, though it may be rare in parts of its range
G5	Demonstrably secure globally, though it may be rare in parts of its range
GH	Of historical occurrence throughout its range, with possibility of rediscovery
GX	Extinct throughout its range
G?	Status unknown
GNR	Global rank not assigned
T#	Infraspecific taxon (trinominal)

S1	Critically imperiled state-wide because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation
S2	Imperiled state-wide because of rarity or factor(s) making it vulnerable
S3	Rare or uncommon in state
S4	Apparently secure in state
S5	Demonstrably secure in state
SA	Accidental in state (usually birds or butterflies that are far outside normal range)
SE	Exotic established in state
SH	Of historical occurrence in state, with possibility of rediscovery
SN	Regularly occurring in state, but in a migratory, non-breeding form
SR	Reported in state, but without good documentation
SX	Extirpated from state
S?	Status unknown

4.7 Cultural Resources

SCE&G has entered into a "Cultural Resources Management Plan and Agreement" ("CRMPA") with S.C. State Historic Preservation Office ("SHPO") and the U.S. Army Corps of Engineers ("USACE") regarding management of potential cultural resources within all proposed line right-of-way corridors associated with construction of VCSNS Units 2 and 3 (*Appendix C*). The identification, assessment, and protection of cultural resources along the routes of the new 230 kV lines associated VCSNS Units 2 and 3, including the VCS1-Killian 230 kV Line, will be pursuant to the CRMPA. The terms of the CRMPA are designed to ensure that cultural resources along the new 230 kV lines are properly identified, assessed, and protected during construction and operation of the lines. Moreover, the CRMPA outlines procedures for the proper notification, assessment, protection, and disposition of inadvertent discoveries that may occur during construction activities. SCE&G will adhere to the provisions of the CRMPA as it applies to new and existing right-of-way corridors upon which the new 230 kV lines will be built.

Since the VCS1-Killian 230 kV Line is integral to the VCSNS Units 2 and 3 project, the analysis of direct and indirect impacts to cultural resources resulting from line construction must be completed according to the U.S Nuclear Regulatory Commission Environmental Standard Review Plan (NUREG 1555, Section 5.1.3 Historic Properties). Pursuant to the requirements of NUREG 1555, SCE&G engaged Brockington and Associates, Inc. ("Brockington"), a national cultural resources consulting firm headquartered in Norcross, Georgia, to conduct background research to determine previously recorded architectural and archaeological resources in the vicinity of the VCS1-Killian 230 kV Line route. As required by the CRMPA, Brockington prepared and submitted a "cultural resources study plan" to SHPO outlining their proposed methodology to execute the work, which included background research on archaeology within 0.5 miles of the proposed line route and background research on historic resources within 1.2 miles of the proposed route. After review, SHPO approved the study plan. The findings are summarized below.

Archaeology

Brockington conducted background research at the Information Management Division of the South Carolina Institute of Anthropology and Archaeology ("SCIAA") and the South Carolina Department of Archives and History ("SCDAH"), both in Columbia, South Carolina. Brockington copied the relevant maps from the SCIAA site files for the area within 0.5 miles of the VCS1-Killian 230 kV Line centerline, including route Options 1 and 2 between the future Blythewood Substation site and the Killian Substation (see Section 2.3), and digitized them into a Geographic Information

System ("GIS") database. The recorded sites are summarized according to their National Register of Historic Places ("NRHP") status in Chart 4.7-1.

Chart 4.7-1: Recorded Archaeological Resources within 0.5 Miles of the VCS-Killian 230 kV Line

VCS1-Killian 230 kV Line (Option 1)

NHRP Status	Number of Archaeological Resources
Listed on the NRHP	0
Eligible for the NRHP	2
Potentially Eligible for the NRHP	5
Ineligible for the NRHP	11
Eligibility for the NRHP Undetermined	42

VCS1-Killian 230 kV Line (Option 2)

NHRP Status	Number of Archaeological Resources
Listed on the NRHP	0
Eligible for the NRHP	0
Potentially Eligible for the NRHP	5
Ineligible for the NRHP	10
Eligibility for the NRHP Undetermined	40

Following the completion of a centerline survey, which included marking right-of-way edges, SCE&G engaged Brockington to conduct a Phase I Cultural Resources Survey throughout the approximate 6 mile right-of-way for the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line, Option 1. The findings of the Phase I survey are documented in a report entitled "*A Phase I Archaeological Resources Survey of the VCS1-Killian 230 kV Line, Richland County, South Carolina*" (*Appendix D*).

Architecture

Brockington conducted a literature review to determine all previously recorded architectural resources within 1.2 miles of the VCS1-Killian 230 kV Line route's centerline, including the two possible route options between the future Blythewood Substation site and the Killian Substation (Section 2.3) and digitized all recorded sites into a GIS database. This review of SCDAH records revealed that fifty-one (51) recorded architectural resources (excluding historic districts) reside

within 1.2 miles of the future line, but none occur in the right-of-way. Chart 4.7-2 summarizes the findings of the architectural records review.

Chart 4.7-2: Recorded Architectural Resources within 1.2 Miles of the VCS-Killian 230 kV Line

VCS1-Killian 230 kV Line (Option 1)

NHRP Status	Number of Archaeological Resources
Listed on the NRHP*	15
Eligible for the NRHP	2
Potentially Eligible for the NRHP	0
Protected Resource Ineligible for the NRHP	0
Ineligible for the NRHP**	36

*Includes 2 historic districts
**Includes 4 resources that Brockington evaluated as eligible and 1 resource that appears to have been demolished

VCS1-Killian 230 kV Line (Option 2)

NHRP Status	Number of Archaeological Resources
Listed on the NRHP*	15
Eligible for the NRHP	2
Potentially Eligible for the NRHP	0
Protected Resource Ineligible for the NRHP	0
Ineligible for the NRHP**	36

*Includes 2 historic districts
**Includes 4 resources that Brockington evaluated as eligible and 1 resource that appears to have been demolished

In addition to the literature review to determine the locations and NRHP status of all previously recorded architectural resources within 1.2 miles of the VCS1-Killian Line, Brockington conducted a "windshield survey". The purpose of the windshield survey was to visually inspect all architectural resources that could be seen from public roads and make *preliminary* determinations of NRHP eligibility regarding each one inspected. During this effort, it was determined that one of the previously recorded resources (Killian School; previously listed as not eligible) has been demolished, and four other previously recorded properties listed as not eligible for the NRHP are now, in Brockington's opinion, eligible. In addition, Brockington identified 53 resources (49 structures and 4 districts) not previously included in SCDAH records that appear to be eligible for the NRHP. Chart 4.7-3 summarizes the findings of the windshield survey regarding architectural resources within 1.2 miles of the proposed VCS1-Killian 230 kV Line:

Chart 4.7-3: Architectural Resources within 1.2 Miles of the VCS-Killian 230 kV Line Based on a Windshield Survey Conducted in April and May, 2011

NRHP Status	Number of Historic Resources
Listed on the NRHP	15
Eligible for the NRHP	59
Not Eligible for the NRHP	31
Demolished Resource (previously recorded as Not Eligible for the NRHP)	1

All resources identified during the windshield survey are ones that would require documentation during a Phase I Cultural Resources Survey as required by Section 106 of the NRHP. Brockington based their opinion regarding NRHP eligibility on the apparent age and visible architectural integrity of the resources; no research was completed on any of them to determine historical associations they may possess.

Brockington summarized their cultural resources research and windshield reconnaissance for the VCS1-Killian 230 kV Line in a letter report dated May 20, 2011 (*Appendix E*).

4.8 Scenic Resources

The degree to which a planned transmission line will affect the scenic environment of the area or region through which it passes is directly related to the scenic quality of the area or region (i.e., the higher the scenic quality, the greater the potential for adverse visual impacts and vice versa). Scenic quality is derived from the interrelationship of multiple factors including landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. The United States Bureau of Land Management ("BLM") has developed a visual resource inventory methodology for use in managing federal lands under its jurisdiction that considers these factors, and SCE&G applied the BLM criteria when assessing the scenic quality of the area within which the VCS1-Killian 230 kV Line will be located. Chart 4.8-1, adapted from the United States Bureau of Land Management's Visual Resource Rating System, provides information about the criteria used to assess scenic quality.

Chart 4.8-1: Scenic Quality Rating Criteria

Explanation of Rating Criteria
Landform
Topography becomes more interesting as it gets steeper or more massive, or more severely or universally sculptured. Outstanding landforms may be monumental, as the Grand Canyon, the Sawtooth Mountain Range in Idaho, the Wrangell Mountain Range in Alaska, or they may be exceedingly artistic and subtle as certain badlands, pinnacles, arches, and other extraordinary formations.
Vegetation
Give primary consideration to the variety of patterns, forms, and textures created by plant life. Consider short-lived displays when they are known to be recurring or spectacular. Consider also smaller scale vegetational features which add striking and intriguing detail elements to the landscape (e.g., gnarled or windbeaten trees, and joshua trees).
Water
That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration in selecting the rating score.
Color
Consider the overall color(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) as they appear during seasons or periods of high use. Key factors to use when rating "color" are variety, contrast, and harmony.
Adjacent Scenery
Degree to which scenery outside the scenery unit being rated enhances the overall impression of the scenery within the rating unit. The distance which adjacent scenery will influence scenery within the rating unit will normally range from 0-5 miles, depending upon the characteristics of the topography, the vegetative cover, and other such factors. This factor is generally applied to units which would normally rate very low in score, but the influence of the adjacent unit would enhance the visual quality and raise the score.
Scarcity
This factor provides an opportunity to give added importance to one or all of the scenic features that appear to be relatively unique or rare within one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not so spectacular elements in the proper combination that produces the most pleasing and memorable scenery - the scarcity factor can be used to recognize this type of area and give it the added emphasis it needs.
Cultural Modifications
Cultural modifications in the landform/water, vegetation, and addition of structures should be considered and may detract from the scenery in the form of a negative intrusion or complement or improve the scenic quality of a unit. Rate accordingly.

The scenic quality rating criteria is used to evaluate and score specific areas according to each area's specific scenic characteristics. Guidance for scoring areas for each of the scenic quality rating criteria is provided in Chart 4.8-2.

Chart 4.8-2: Scenic Quality Inventory and Evaluation Chart

Key factors	Rating Criteria and Score	Rating criteria and Score	Rating Criteria and Score
Landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features dominant and exceptionally striking and intriguing such as glaciers. **5**	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional. **3**	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. **5**	Some variety of vegetation, but only one or two major types. **3**	Little or no variety or contrast in vegetation. **1**
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. **5**	Flowing, or still, but not dominant in the landscape. **3**	Absent, or present, but not noticeable. **0**
Color	Rich color combinations, variety or vivid color; or pleasing contrasts in the soil, rock, vegetation, water or snow fields. **5**	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. **3**	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. **5**	Adjacent scenery moderately enhances overall visual quality. **3**	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc.* **5+**	Distinctive, though somewhat similar to others within the region. **3**	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add favorably to visual variety while promoting visual harmony. **2**	Modifications add little or no visual variety to the area, and introduce no discordant elements. **0**	Modifications add variety but are very discordant and promote strong disharmony. **-4**

NOTE: *Values for each rating criteria are maximum and minimum scores only. It is also possible to assign scores within these ranges.*

* *A rating greater than 5 can be given to this criterion in the scarcity category, but should be supported by written documentation.*

By applying the appropriate rating criteria and appropriate scores for each of the key factors shown in Chart 4.8-2 based on actual scenic conditions present along the VCS1-Killian Line route, SCE&G arrived at total scores for individual sections of the line route that indicate the scenic quality of each section. The following is the BLM explanation of scenic quality, which is indicated by the total scores:

Score	Scenic Quality
19 or higher	High Scenic Quality
12-18	Moderate Scenic Quality
11 or lower	Low Scenic Quality

Scoring Methodology

Landscape architects and professional geographers, on SCE&G's behalf, conducted a GIS analysis of vegetation, hydrography, land use, and topography along the VCS1-Killian 230 kV Line route to gain insight into key scenic quality factors including landform, vegetation, water, color, and influence of adjacent scenery. Additionally, a windshield survey was conducted to observe, record, and photograph visual conditions along public roads in the immediate vicinity of the line route. The line route was segmented into seven (7) sections based on similarity of scenic conditions represented by each section. The seven sections include the two possible line route options (Section 2.3) between the future Blythewood and Killian 230/115 kV Substations. Finally, each section was scored using the BLM scoring protocol.

The following is a discussion of the scenic conditions in each of the seven (7) sections and the resulting scenic quality score.

VCSNS Switchyard 1 to U.S. Highway 321 Bypass near Winnsboro

The route passes through a sparsely developed, rural region between the V.C. Summer Nuclear Station Unit 1 Switchyard to the U.S. Highway 321 Bypass corridor near Winnsboro, a distance of approximately 14.1 miles. The visual character along this segment of the line route is typical of rural piedmont landscapes in South Carolina. The vast majority of the line route is surrounded by forestlands. Residential development is very low density, rural residential, and generally limited to the road corridors. Contributing to the visual character and quality of the area are a few churches and cemeteries located along the public roads in the vicinity of the line route and occasional farmsteads with typical farm houses, granaries, barns, equipment sheds and other out-buildings. Also contributing to the visual quality of the area are a few pastures and very limited number of agricultural fields that provide visual relief to the otherwise closed road corridors where tree growth and forestlands significantly limit views. In the immediate vicinity of the line route, the visual character of the area is currently modified by the existing transmission lines on the open corridor within which the proposed VCS1-Killian 230 kV Line will be built.

VCSNS Switchyard 1 to U.S. Highway 321 Bypass near Winnsboro Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	Some variety of vegetation, but only one or two major types. **3**
Water	Absent, or present, but not noticeable. **0**
Color	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add favorably to visual variety while promoting visual harmony. **2**

Total Scenic Quality Score: 8

U.S. Highway 321 Bypass to S.C. Highway 34 (Winnsboro Segment)

From the vicinity of the Highway 321 Bypass crossing to the U.S. Highway 321 Business crossing, the line route traverses an undeveloped area for about 0.6 miles to an existing SCE&G substation, then through a municipal golf course for approximately 0.33 miles before reaching the Highway 321 Business crossing point, which is approximately 1.1 miles south of downtown Winnsboro. In the immediate Highway 321 Business corridor, the line route passes through strip residential development along the road before traversing an undeveloped area for approximately 0.25 miles. Upon exiting the undeveloped area, the line route enters an industrial area and runs parallel with a railroad along the industrial area's eastern edge for 0.27 miles. The line route turns and departs the industrial area and runs through a strip of residential development as it crosses State Road (SR) 20-34 (Rockton Thruway). On the east side of SR 20-34, the line route turns and runs in a southerly direction through an open area on the east side of a residential area along SR 20-201 (Fagan Road) and Cherry Road for approximately 0.8 miles to a point where it turns and runs in a southwesterly direction, departing the Town of Winnsboro, to a point on the south side of S.C. Highway 34.

In summary, the line route passes through Winnsboro by skirting developed areas (recreational, residential, and industrial). The visual character of the immediate area through which the route passes is highly modified by existing development, electrical distribution lines, rail lines, road signs, and existing transmission lines. Photograph 4.8-1 shows the area where the VCS1-

Killian Line route crosses U.S. Highway 321 Business, which is between the 2nd and 3rd houses in the photograph.

Photograph 4.8-1: Looking North Toward the U.S. Highway 321 Business Crossing Point

U.S. Highway 321 Bypass to S.C. Highway 34 (Winnsboro Segment) Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	Some variety of vegetation, but only one or two major types. **3**
Water	Absent, or present, but not noticeable. **0**
Color	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add variety but are very discordant and promote strong disharmony. **-1**

Total Scenic Quality Score: 5

S.C. Highway 34 to Interstate Highway 77

After crossing S.C. Highway 34, the VCS1-Killian 230 kV Line route turns near an industrial facility and runs parallel to Highway 34 on its south side for approximately 2.1 miles. The area is rural in character, with sparse development. Planted pine plantations dominate the south side of Highway 34 along this segment of the line's route with only one commercial building residing in the 2.1 mile stretch. One cemetery, surrounded by a low rock wall in a grove of hardwood trees, resides adjacent to Highway 34 on its south and the existing transmission line right-of-way within which the proposed line will be located jogs around it. A railroad parallels Highway 34 on the north side of the road where pine forests are also dominant along the road/railroad corridor. On the north side, however, a few residences and associated yards provide a break in the otherwise continuous forest condition that encloses much of the road/railroad corridor. The dominant rural visual character of the area where the line route parallels Highway 34 is currently modified by the road itself and associated roadway signage, the railroad, existing electrical transmission and distribution lines, and light development (residential, commercial and industrial).

The line route crosses Highway 34 approximately 0.8 miles northwest of the Gum Springs Road intersection, and follows a "cross country" route north of Highway 34 through an undeveloped area for approximately 2.76 miles until it re-intersects with and crosses Highway 34 a second time. On this portion of the line route, the most dominant visual quality is pine and mixed pine/hardwood forests which dominate the landscape with a minor amount of grassland occurring in the area.

After crossing Highway 34 a second time, the VCS1-Killian 230 kV Line route continues in a southerly direction for approximately 2.4 miles to the Interstate Highway 77 ("I-77") crossing point. The visual condition of this portion of the line route is characterized by mixed development that includes farmsteads on the northern portion with expanses of open grassland, industrial development near the Cook Road/East Peach Road intersection, and undeveloped land between East Peach Road and I-77.

S.C. Highway 34 to Interstate Highway 77 Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	Some variety of vegetation, but only one or two major types. **3**
Water	Absent, or present, but not noticeable. **0**
Color	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add little or no visual variety to the area, and introduce no discordant elements. **0**

Total Scenic Quality Score: 6

Interstate Highway 77 to Blythewood Road

The VCS1-Killian Line Route crosses I-77 approximately 0.65 miles south of the East Peach Road interchange. On the east side of I-77, the route turns and runs in a southerly direction parallel to the highway for approximately 4.2 miles to the Blythewood Road interchange. Through this section, the route passes through a continuously forested area, primarily pine with some mixed pine/hardwood forests. Along this section, a continuous buffer of pine and early succession hardwood species provides a visual buffer between I-77 and the existing cleared right-of-way within which the VCS1-Killian Line will be built.

Interstate Highway 77 to Blythewood Road Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	Some variety of vegetation, but only one or two major types. **3**
Water	Absent, or present, but not noticeable. **0**
Color	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add little or no visual variety to the area, and introduce no discordant elements. **0**

Total Scenic Quality Score: 6

Blythewood Road to the Future Blythewood 230/115 kV Substation Site

The VCS1-Killian Line route crosses Blythewood Road near the I-77 interchange in an area that is highly modified with commercial development, traffic signs and signals, the transportation infrastructure and existing electrical lines. Approximately 0.2 miles south of Blythewood Road, the route turns east and runs in an easterly direction, crossing U.S. Highway 21, for approximately 0.42 miles. At the eastern edge of the Highway 21 right-of-way, the line route turns south and runs parallel with the highway for approximately 1.4 miles to the future Blythewood 230/115 kV Substation site. Pine and mixed pine/hardwood forests occur randomly along the line route as it runs parallel to Highway 21 and the visual condition is highly modified by transportation infrastructure, a railroad, industrial development, and a very small number of residences in the highway corridor.

Blythewood Road to the Future Blythewood 230/115 kV Substation Site Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	Little or no variety or contrast in vegetation. **1**
Water	Absent, or present, but not noticeable. **0**
Color	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add variety but are very discordant and promote strong disharmony. **-2**

Total Scenic Quality Score: 2

Future Blythewood 230/115 kV Substation Site to Killian 230/115 kV Substation (Option 1)

This approximate 6 mile section of the VCS1-Killian 230 kV Line route will not be built within an existing SCE&G right-of-way and will therefore require clearing of a new right-of-way that has been selected utilizing SCE&G's comprehensive transmission line siting process. Leaving the future Blythewood 230/115 kV Substation site, the route runs along a railroad for approximately 3 miles. Through this area, it passes between a residential area and an industrial area; thus, the visual character is highly modified. After leaving the railroad corridor, the route runs along Farrow Road for approximately 0.7 miles. Along Farrow Road, it passes three commercial buildings before reaching Clemson Road where it turns and runs with Clemson Road in a southwesterly direction for approximately 0.5 miles across lands that are slated for residential development. Near the intersection of Clemson and Killian Roads, the line route turns and runs in a south/southeasterly direction across grassland and pine forests for approximately 1.4 miles to Killian 230/115 kV Substation.

Future Blythewood 230/115 kV Substation Site to Killian 230/115 kV Substation (Option 1)

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	Little or no variety or contrast in vegetation. **1**
Water	Absent, or present, but not noticeable. **0**
Color	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add little or no visual variety to the area, and introduce no discordant elements. **0**

Total Scenic Quality Score: 4

Future Blythewood 230/115 kV Substation Site to Killian 230/115 kV Substation (Option 2)

As explained in Chapter 2, Section 2.2, there is a possibility the VCS1-Killian 230 kV Line between the future Blythewood 230/115 kV Substation and Killian 230/115 kV Substation will be built on an existing SCE&G 115 kV right-of-way if it becomes necessary to support the critical in-service date for the line. In this event, the existing 115 kV line will be rebuilt to a double-circuit 230/115 kV line that will accommodate the VCS1-Killian circuit and the existing 115 kV circuit. The new right-of-way (Option 1, immediately above) would be used for a second 115 kV tie line between the Blythewood and Killian 230/115 kV Substations. This section addresses scenic quality along the existing 115 kV right-of-way between the future Blythewood 230/115 kV Substation and Killian 230/115 kV Substation if Option 2 is used.

Leaving the future Blythewood 230/115 kV Substation site, the route follows Farrow Road in a southerly direction through an industrial area for approximately 2.4 miles before turning to a southeasterly direction and running through a small undeveloped, pine-forested track and a high-density residential area. After passing through the residential area, the route crosses Longreen Parkway and enters a commercial area as it turns and runs parallel with Clemson Road to its intersection with Longtown Road. At Longtown Road, the line turns and runs with the road for approximately 0.65 miles through a mixed use area (commercial/residential) to the intersection with the railroad running parallel with Farrow Road. The route turns south and parallels the railroad for a short distance (approximately 0.25 miles) before turning to a southeasterly direction and running through a small woodlot and then with Sloan Road through a residential area a total distance of

approximately 0.5 miles. From the Sloan Road corridor, the route turns, runs by a residential area on Old Sloan Road and into the Killian 230/115 kV Substation.

Future Blythewood 230/115 kV Substation Site to Killian 230/115 kV Substation (Option 2)

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	Little or no variety or contrast in vegetation. **1**
Water	Absent, or present, but not noticeable. **0**
Color	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add variety but are very discordant and promote strong disharmony. **-1**

Total Scenic Quality Score: 3

Summary

Application of the BLM methodology for assessing scenic quality along the route of the VCS1-Killian 230 kV Line reveals the entire line route will be located within low scenic quality areas (total scenic quality scores of 11 or less). This does not necessarily indicate unattractiveness or lack of interesting landscape character of the area; rather, it is a metric that correctly indicates lack of topographic high points that would offer interesting elevation relief and long views and vistas, lack of landscape diversity (water, texture, color), lack of adjacent scenic features visible from the immediate area of the line route, and the degree to which the line passes through areas that are highly modified by various types of development and infrastructure. It is an indicator of the ability of the area to absorb visual modifications, such as those associated with the future line, with minimal adverse impacts to the area's scenic quality.

5.0 CONSEQUENCES OF THE PROPOSED ACTION

This chapter describes short- and long-term effects to environmental resources, land use, and cultural resources that will occur as a result of construction and operation of VCS1-Killian 230 kV Line. An array of environmental, cultural resource, land use and scenic data were collected from various local, state and federal agencies and developed from field studies to support the findings presented in this chapter. The data were organized into data layers and mapped for the VCS1-Killian 230 kV Line data collection and analysis area (*Figure 4.0-1*).

The predicted effects presented in this chapter are included for the two possible options for the VCS1-Killian 230 kV line that are created by the use of either Option 1 or Option 2 for the segment of the line that will run between the future Blythewood 230/115 kV Substation and the Killian 230/115 kV Substation (Section 2.3). The two options are identical except for the segment of the line route between the future Blythewood Substation and Killian Substation (Blythewood-Killian Segment). The following is a description of the two options:

- **VCS1-Killian 230 kV Line (Option 1)**
  This option, which is the primary option, will utilize existing SCE&G right-of-way except for an approximate 6 mile segment between the future Blythewood and existing Killian 230 kV Substations. The total VSC1-Killian Line length using this option is approximately 37 miles.

- **VCS1-Killian 230 kV Line (Option 2)**
  This option will utilize existing SCE&G right-of-way for its entire length. If this option is used, the newly sited approximate 6 mile route between the future Blythewood and existing Killian 230 kV Substations is still required and will be used for a second 115 kV tie line between the two substations (see Section 2.3 for additional information regarding when Option 2 would be used due to critical schedule considerations). If it becomes necessary to utilize this option, which is a secondary option, the total length of the VCS1-Killian Line will be approximately 37 miles.

5.1 Soils

The potential for soil erosion exists where it will be necessary to expose mineral soils during grading associated with access road improvement and augering for transmission structure erection. Prudent construction and erosion-control measures will be used to avoid potential minor, short-term impacts, and disturbed soils will be stabilized with vegetation as construction progresses

over the length of the affected rights-of-way. Very minimal grading and earthwork activities are anticipated due to the utilization of existing rights-of-way and access roads. Moreover, SCE&G uses "no-grub" clearing techniques wherever clearing is required and will comply with the S.C. Stormwater Management and Sediment Reduction Act with all right-of-way and line construction operations. SCE&G will use clearing, seeding, and erosion-control procedures that meet or exceed the standards set forth in local, state, and federal requirements and will comply with agency recommendations regarding prevention of soil erosion and sediment movement.

5.2 Prime Farmlands and Farmlands of Statewide Importance

Prime farmland is comprised of soils (and slopes) that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. The land could be cropland, pastureland, rangeland, forestland, or other land, but not urban built-up land or water. Prime farmland has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to sound farming methods. In general, prime farmlands have an adequate and dependable moisture supply, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time. Typically, they do not flood during the growing season or they are protected from flooding.

Farmlands of Statewide Importance are soils that are, in addition to prime farmland, important for the production of food, feed, forage, fiber, and oil seed crops. Generally, farmlands of statewide importance include soils that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce crop yields as high as prime farmlands if conditions are favorable. Chart 5.2-1 lists the acreage of Prime Farmland and Farmland of Statewide Importance that occur in the right-of-way corridors of the VCS1-Killian 230 kV Lines (Options 1 and 2) (*Figure 5.2-1*).

Chart 5.2-1 Affected Prime Farmland and Farmland of Statewide Importance

	Acres
VCS1-Killian 230 kV Line (Option 1)	
Prime Farmland	89.0
Farmland Of Statewide Importance	33.2
Prime Farmland If Protected From Flooding Or Not Frequently Flooded During The Growing Season	6.2
Prime Farmland If Drained And Either Protected From Flooding Or Not Frequently Flooded During The Growing Season	2.8
Not Prime Or Important Farmland	212.5
VCS1-Killian 230 kV Line (Option 2)	
Prime Farmland	89.2
Farmland Of Statewide Importance	30.7
Prime Farmland If Protected From Flooding Or Not Frequently Flooded During The Growing Season	6.2
Prime Farmland If Drained And Either Protected From Flooding Or Not Frequently Flooded During The Growing Season	2.8
Not Prime Or Important Farmland	186.1

Farming, including crop production, is a permitted use on SCE&G transmission line rights-of-way throughout its system.

Although the new approximate 6 mile right-of-way for the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line (Option 1) crosses lands classified as Prime Farmland and Farmland of Statewide Importance, none of the lands are presently being used for agricultural production.

5.3 Water Resources

The VCS1-Killian 230 kV Line will cross a number of streams (Section 4.3) along its route from the VCSNS Switchyard 1 to the Killian 230/115 kV Substation (*Figure 5.3-1).* Any existing low-growing vegetation will be left intact to the maximum practical extent in stream buffer zones, and root mats in any specified buffer zones will not be disturbed.

Construction of the VCS1-Killian 230 kV Line will present the potential for erosion and runoff contributions to nearby streams and wetlands; however, the use of existing, established rights-of-way greatly minimizes the potential of this impact. Where required, SCE&G will carefully design measures and plan work to prevent any sediment-laden runoff beyond designed erosion-control devices (sediment basins, sediment traps, silt fences, etc.). SCE&G will comply with the S.C. Stormwater Management and Sediment Reduction Act related to water quality protection and will comply with the recommendations of various regulatory agencies, including the S.C. Department of Natural Resources, S.C. Department of Health and Environmental Control, the U.S.

Army Corps of Engineers, etc. All activities will be conducted in a manner that will not jeopardize the State water quality standards and existing water uses. The erosion-control measures and Best Management Practices employed will be sufficient to prevent any sediment movement beyond construction limits during a 10-year storm event. Measures will also be taken to prevent sediment, trash, debris, and other man-made pollutants from entering sensitive areas.

The VCS1-Killian 230 kV Line will span over wetlands along its route *(Figure 5.3-2);* however, no access roads will be built in wetlands; wetland contours will not be changed; and no wetlands will be converted to uplands. To the maximum extent practical, SCE&G will design the lines to avoid placement of line structures in wetlands. SCE&G will use selective clearing measures in forested wetlands, leaving the root zone and as much low-growing vegetation as possible in the wetlands and associated wetland buffers to prevent erosion. Only those trees that pose a current or potential safety problem (i.e., trees that would or will interfere with the reliable, safe operation of the lines) will be removed. Clearing in forested wetlands will be done by hand-clearing methods or by high-flotation equipment suitable for operation in wetlands. Moreover, all work in wetlands will be done in strict compliance with U.S. Army Corps of Engineers 404 Permit conditions, which SCE&G will obtain before line construction begins.

Before construction begins on the transmission lines, supervisors will be given plan-and-profile drawings for the projects to provide them with locations of the structures and specific locations and requirements of any sensitive areas, including stream buffers and wetlands. All state and federal permits related to wetlands and water quality protection will be obtained before construction begins. Periodic inspections will be performed to ensure compliance with all permit conditions and application of construction practices designed to protect sensitive resources.

Chart 5.3-1 lists all hydrological resources that could potentially be affected by construction activities associated with the VCS1-Killian 230 kV Line (Options 1 and 2); however, because of the measures SCE&G will implement to protect wetlands, no impacts are anticipated except for the conversion of 12.5 acres of forested wetlands to permanent herbaceous wetlands if the line is built on the primary route (Option 1). If the line is built on the existing right-of-way between the future Blythewood and existing Killian 230/115 kV Substations (Option 2), conversion of forested wetlands to permanent herbaceous wetlands will total 1.5 acres where clearing will be required to remove trees that have encroached into the existing right-of-way.

Chart 5.3-1 Affected Wetlands and Stream Buffers

	Acres
VCS1-Killian 230 kV Line (Option 1)	
Acres of river, lake or pond in the right-of-way	1.3
Acres of wetland within the right-of-way impacted by clearing within the wetland	12.5
Acres of wetland within the right-of-way **not** impacted by clearing within the wetland	13.3
Acres of upland within the right-of-way requiring hand-clearing within 100' of any stream, river, lake, pond, or wetland	4.5
Acres of upland within the right-of-way and **not** requiring clearing within 100' of any stream, river, lake, pond, or wetland	25.7
Acres of river, lake or pond outside the right-of-way and within the 2000' route corridor	43.9
Acres of forested wetland outside the right-of-way and within the 2000' route corridor	157.1
Acres of non-forested wetland outside the right-of-way and within the 2000' route corridor	60.5
Acres of forested upland outside the right-of-way and within the 2000' route corridor, within 100' of any stream, river, lake, pond, or wetland	521.9
Acres of non- forested upland outside the right-of-way and within the 2000' route corridor, within 100' of any stream, river, lake, pond, or wetland	249.9
VCS1-Killian 230 kV Line (Option 2)	
Acres of river, lake or pond in the right-of-way	1.4
Acres of wetland within the right-of-way impacted by clearing within the wetland	1.5
Acres of wetland within the right-of-way **not** impacted by clearing within the wetland	14.6
Acres of upland within the right-of-way requiring hand-clearing within 100' of any stream, river, lake, pond, or wetland	2.2
Acres of upland within the right-of-way and **not** requiring clearing within 100' of any stream, river, lake, pond or wetland	24.4
Acres of river, lake or pond outside the right-of-way and within the 2000' route corridor	55.8
Acres of forested wetland outside the right-of-way and within the 2000' route corridor	111.9
Acres of non-forested wetland outside the right-of-way and within the 2000' route corridor	49.5
Acres of forested upland outside the right-of-way and within the 2000' route corridor, within 100' of any stream, river, lake, pond, or wetland	512.6
Acres of non- forested upland outside the right-of-way and within the 2000' route corridor, within 100' of any stream, river, lake, pond, or wetland	248.1

5.4 Flood-Prone Areas

SCE&G obtained the Federal Emergency Management Agency National Flood Insurance Program maps for areas that might be affected by the VCS1-Killian 230 kV Line (*Figure 5.4-1).* The maps were compiled and intersected with the line corridors to ascertain the effects. The results are summarized in Chart 5.4-1.

Chart 5.4-1 Affects to FEMA Flood Zones

	Acres
VCS1-Killian 230 kV Line (Option 1)	
Zone AE - Floodway	1.2
Zone AE - Areas of 100-Year Flood (Base Elevations Determined)	3.5
Zone A - Areas of 100-Year Flood (No Base Flood Elevations Determined)	3.3
Zone C - Areas of Minimal Flooding	242.5
Zone X - Areas Determined to be Outside 500-Year Floodplain	93.2
VCS1-Killian 230 kV Line (Option 2)	
Zone AE - Floodway	1.0
Zone AE - Areas of 100-Year Flood (Base Elevations Determined)	3.0
Zone A - Areas of 100-Year Flood (No Base Flood Elevations Determined)	3.5
Zone C - Areas of Minimal Flooding	242.2
Zone X - Areas Determined to be Outside 500-Year Floodplain	65.1

The U.S. Department of Agriculture, Rural Utility Service Bulletin 1794A-600, states the following in Section 3.2 regarding the placement of electrical transmission line structures in floodplains: *"Floodplain management requires Federal agencies to avoid actions, to the extent practicable, which will result in the location of facilities in floodplains and/or affect floodplain values. Facilities located in a floodplain may be damaged seriously by floodwaters or may change the flood handling capability of the floodplain or the pattern or magnitude of the flood flow. Normally single pole structures and buried cable should be considered to have no significant impact on floodplain values."* The single pole structures that will be used on the VCS1-Killian 230 kV Line will have no measurable effect on floodplain values, and the reliability of the lines will not be affected by the segments of the lines that will reside in floodplain zones. Moreover, when engineering the VCS1-Killian 230 kV Line, SCE&G will avoid locating transmission line structures in flood zones to the maximum extent practical.

5.5 Land Use

SCE&G collected and mapped existing and future land use data over the VCS1-Killian 230 kV Line Route (*Figures 5.5-1 and 5.5-2*). Also, the zoning classifications, where applicable, were mapped. The most significant effect to land use resulting from construction of the VCS1-Killian 230 kV Line will be the permanent restriction on the erection of buildings and timber production in the approximate 6 mile segment of the line that will require new right-of-way between the future Blythewood 230/115 kV Substation and Killian 230/115 kV Substation *(Figure 2.2-18)*. Those restrictions are currently in effect along the existing right-of-way within which the VCS1-Killian 230 kV Line will be built. Permitted uses in the right-of-way will include pastures, crop production, road construction, parking lots, and other uses that will not interfere with the safe, reliable operation of the line. Chart 5.5-1 lists the acreages of land uses within the right-of-way for the VCS1-Killian 230 kV Line (Options 1 and 2).

Chart 5.5-1 Affected Land Use

	Acres
VCS1-Killian 230 kV Line (Option 1)	
Communication Tower with 100' Buffer	0.0
Electrical Transmission Right-of-Way - South Carolina Electric & Gas Company	271.0
Gas Pipeline Right-of-Way - Carolina Gas Transmission Company	0.2
Land Dedicated to Public Use	5.5
Major Roadway	0.3
No Designated Land Use	50.9
Place of Worship	2.6
Power Facility	0.5
Power Generation	0.3
Railroad Right-of-Way	4.2
Secondary Roadway	8.3
VCS1-Killian 230 kV Line (Option 2)	
Electrical Transmission Right-of-Way - South Carolina Electric & Gas Company	302.2
Major Roadway	0.3
Power Facility	1.0
Power Generation	0.3
Railroad Right-of-Way	1.2
Secondary Roadway	10.1

The locations of all occupied buildings within 1,000' of the VCS1-Killian 230 kV Line were digitized from aerial photography and field studies and compiled in a GIS database (*Figure 5.5-3).* Chart 5.5-2 displays the quantity of occupied buildings that will be within various distances of VCS1-Killian 230 kV Line (Options 1 and 2).

Chart 5.5-2 Proximity of Occupied Buildings

	Number
VCS1-Killian 230 kV Line (Option 1)	
Number of occupied buildings within the proposed line's R/W (New R/W)	0
Number of occupied buildings encroaching on the proposed line's R/W (existing R/W)	0
Number of occupied buildings outside of the R/W and within 200' of the proposed line	93
Number of occupied buildings between 200' and 500' of the proposed line	396
Number of occupied buildings between 500' and 1000' of the proposed line	794
Total	**1283**
VCS1-Killian 230 kV Line (Option 2)	
Number of occupied buildings encroaching on the proposed line's R/W (existing R/W)	0
Number of occupied buildings outside of the R/W and within 200' of the proposed line	168
Number of occupied buildings between 200' and 500' of the proposed line	464
Number of occupied buildings between 500' and 1000' of the proposed line	872
Total	**1504**

5.6 Land Cover

A land cover inventory was developed for the VCS1-Killian 230 kV Line from 2009 United States Department of Agriculture (USDA) aerial photography (*Figure 5.6-1);* wetland vegetation was further defined by an analysis of 2006 Color Infrared USGS Digital Ortho Quad (DOQ), USDA Soils Data, USGS/SCDNR Hypsography, and USFWS National Wetlands Inventory. Scrub/Shrub

(mostly vegetation re-growth) is the dominant land cover in the existing right-of-way within which the VCS1-Killian will be built. Chart 5.6-1 lists the quantity and types of land cover that will be affected by the VCS1-Killian 230 kV Line (Options 1 and 2).

Chart 5.6-1 Affects to Land Cover

	Acres
VCS1-Killian 230 kV Line (Option 1)	
Barren	9.2
Cropland	0.4
Grass/Pasture	84.4
Hardwood Forest	11.7
Mixed Hardwood/Pine Forest	5.4
Pine Forest	12.4
Riparian Vegetation	0.0
Scrub/Shrub	174.6
Urban/Built-up	18.4
Water	1.5
Wetland	25.8
VCS1-Killian 230 kV Line (Option 2)	
Barren	7.4
Cropland	0.4
Grass/Pasture	90.8
Hardwood Forest	6.1
Mixed Hardwood/Pine Forest	2.1
Pine Forest	5.7
Riparian Vegetation	0.0
Scrub/Shrub	168.0
Urban/Built-up	17.0
Water	1.5
Wetland	16.2

5.7 Wildlife

Various studies (Duke Power Company et al, 1976; Michael et al., 1976; Shreiber et al., 1976; Cavanagh et al., 1976) conclude that rights-of-way clearing through forested areas will have an effect on the fauna of the immediate area. In the Duke Power study, which was conducted in the Piedmont section of South Carolina (Rock Hill-Lancaster region), it was found that herbaceous and brushy plant communities that become established in Piedmont transmission line corridors provide a habitat that:

1) Precludes use of the area by some of the pre-existing species such as some woodland birds and small mammals;

2) Enhances aspects of the area for some pre-existing species, providing them with certain beneficial factors associated with food and cover; and,

3) Encourages invasion by species previously absent in the area.

Species discouraged from inhabiting cleared areas of the corridor are those restricted to woodland habitats. Of the birds of the Piedmont, such species would include many warblers,

woodpeckers, Carolina chickadee, tufted titmouse, yellow-billed cuckoo, crested flycatcher, brown-headed nuthatch, wood thrush, red-eyed vireo, and rose-breasted grosbeak, among others. Examples of mammals that would be discouraged from the area would be the white-footed mouse and golden mouse.

Species that would benefit from the new habitat provided by cleared areas include vultures, hawks, foxes, and possibly other predators. These species, though generally associated with other habitats, seem to concentrate portions of their activities in cleared corridors. Vultures and hawks (especially the red-tailed hawk) are commonly seen perched on transmission line towers or soaring over the corridors. Possibly these perches, in conjunction with the dense rodent populations of the corridors, provide better hunting areas. The fact that small mammal populations are denser in corridors than in woodlands may account for the use of corridors by foxes. Studies have shown that foxes commonly feed on the cotton rat and meadow vole in transmission line corridors. Thus, a typical woodland animal, such as the gray fox, may commonly venture into corridor habitats because of the accessible food supply.

Species previously absent or uncommon that move into an area following the establishment of a transmission line corridor, are those typically associated with open spaces or with herbaceous or brushy habitats. In the Piedmont, such species of birds would include various sparrows, meadowlark, red-winged blackbird, blue grosbeak, prairie warbles, yellow-throat, yellow-breasted chat, and indigo bunting, among others. Mammals include the rice rat, cotton rat, meadow vole, and harvest mouse. Certain amphibians (upland chorus frog, southern leopard frog) that prefer to breed in open grassy areas also benefit from transmission line corridors.

Among the birds that inhabit transmission line corridors, some actually live in the herbaceous vegetation of the corridor, while others inhabit areas along streams passing through the corridor or trees adjacent to the corridor. Examples of the former include the field sparrow, song sparrow, meadowlark, red-wing, and yellow-throat, among others. Species inhabiting trees on the immediate edge of a corridor or trees along a stream crossing are sometimes called "edge species." These species, which include in part the indigo bunting, yellow-breasted chat, prairie warbler, and towhee, prefer to inhabit woodlands adjacent to open spaces. Thus, while they inhabit trees, their presence is due to the open nature of the corridor.

Also, transmission line corridors, as managed by SCE&G, support an assemblage of non-game species. The planted and invading native vegetation, in conjunction with the small trees left in selected locations, create a habitat for various species preferring open herbaceous habitats and

edge habitats. These anticipated and predicted corridor clearing effects will occur over approximately 13.26% of the VCS1-Killian 230 kV Line (Option 1) route corridor, and none will occur over the Option 2 line route.

The creation of linear openings in heavily timbered areas is a standard wildlife management technique to increase the carrying capacity for woodland game. Thus, the open corridor segments that will be created on the new segment of the VCS1-Killian 230 kV Line (Option 1) with invading herbaceous species should be advantageous to the larger game animals in the area (deer and wild turkey), as well as certain non-game species.

An issue associated with large raptors is their vulnerability to power line electrocution. Their large size, wingspan, and perching make them susceptible to electrocution on certain transmission line designs. Transmission line structures with inadequate spacing between phases (i.e., less than 60 inches of separation between conductors and/or grounded hardware) can cause raptor electrocutions. With this in mind, the USFWS has recommended, under authority of the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act, that all new transmission structures be equipped with design features that prevent these electrocutions. Such features typically include designs that (1) make the distance between phase conductors greater than the wingspread of the bird that is landing, perching, or taking off; and (2) increase the distance between grounded hardware (e.g., ground-wires) and an energized conductor to more than the largest bird's wingspread or the distance from the tip of the bill to the tip of the tail. The structures that will be used for the VCS1-Killian 230 kV Line will be "raptor safe" and meet the guidelines recommended in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (Avian Power line Interaction Committee 2006); therefore, raptor electrocutions are not anticipated on this project.

5.8 Cultural Resources

The VCS1-Killian 230 kV Line is an integral part of the VCSNS Units 2 and 3 project and is included in the application filed by SCE&G and Santee Cooper on March 31, 2008, to the NRC for a COL for the two new nuclear generating units (VCSNS Units 2 and 3). Consequently, construction of the VCS1-Killian Line is a "federal undertaking" and must be conducted pursuant to the requirements of Section 106 of the National Historic Preservation Act of 1966. The following provides background information regarding the federal requirements and federal agencies that will have a role in the VCS1-Killian 230 kV Line project.

Background Information Regarding Federal Requirements

The NRC has prepared and published Environmental Standard Review Plans ("ESRPs") for the guidance of the Office of Nuclear Reactor Regulation staff responsible for environmental reviews for nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. ESRPs are not substitutes for regulatory guides or the NRC's regulations, and compliance with them is not required. The ESRPs are keyed to preparation of Environmental Reports for Nuclear Power Stations. NUREG-1555 is the Environmental Standard Review Plan for New Site / Plant Applications and requires the identification of any "historic properties within 16 km (10-mi.) of the plant site and within 2 km (1.2-mi.) of proposed transmission line routes, access corridors, and offsite areas that are in or have been determined eligible for inclusion in the National Register of Historic Places ("NRHP") or are included in State or local registers or inventories of historic and cultural resources . . . ." Moreover, NUREG-1555 provides guidance on specific studies, information, and types of data that must be conducted and considered in order to determine the types and magnitude of potential impacts to cultural resources that may result from proposed actions.

Planned construction of the two new nuclear generating units at the existing V.C. Summer Nuclear Station will result in the placement of fill in waters of the United States. Additionally, new transmission lines that must be constructed in conjunction with the new nuclear generating units will cross federal and state navigable waters and will result in the conversion of forested wetlands to permanent herbaceous wetlands. Thus, the planned action will require federal permitting pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 and is therefore considered to be a federal undertaking.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, the effects of any federal undertaking on historical resources must be considered prior to the beginning of construction. As part of their responsibilities related to the federal permits under their jurisdiction (Section 404 and Section 10 Permits), the USACE entered into consultation with the SHPO to discuss the management of cultural resources as it relates to this project and compliance with Section 106 of the National Historic Preservation Act. The USACE is a "cooperating agency" within the context of the National Environmental Policy Act where the NRC is serving as the lead agency preparing an Environmental Impact Statement for the federal undertakings. The USACE must satisfy NEPA requirements and its internal regulations regarding consultation obligations

associated with its Section 404 and Section 10 Permit decisions, which includes consultation with the SHPO regarding Section 106 of the National Historic Preservation Act.

Pursuant to the joint responsibility shared by SCE&G, the SHPO, and the USACE to ensure compliance with Section 106 of the National Historic Preservation Act, the parties (SCE&G, SHPO and USACE) have entered into a Cultural Resources Management Plan and Agreement ("CRMPA") that specifies how SCE&G will identify, assess, and protect cultural resources that could potentially be impacted by the construction, operation and maintenance of the VCSNS Units 2 and 3 and associated transmission lines, including the VCS1-Killian 230 kV Line (*Appendix C*).

As part of its obligations under the CRMPA, SCE&G contracted with a "*professional meeting the Secretary of the Interior's Professional Qualifications Standards in history or architectural history*," Brockington and Associates, Inc. ("Brockington"), to conduct cultural resource investigations along the VCS1-Killian 230 kV Line route. Specifically, the investigations focus on the geographic area within 1.2 miles on either side of the route's centerline, which is referred to as the *"study area,"* and contains 96.3 square miles. In the following four (4) categories are descriptions of the investigations SCE&G contracted Brockington to conduct along the VCS1-Killian Line route, including both route options (Options 1 and 2) on the Blythewood-Killian Segment:

1. **Literature Review-Architecture**:

   This review was conducted to determine if any properties or sites in the study area have been recorded in the records of the South Carolina Department of Archives and History ("SCDAH") in Columbia, South Carolina, and the NRHP eligibility status of each recorded resource. The data, which the SCDAH maintains in a computerized Geographic Information System, include the following:

   - All aboveground resources recorded after 1989, including their NRHP eligibility;
   - All cultural resources studies conducted since 1989; and,
   - All archaeological sites, structures, and districts that are listed on the NRHP.

   Additionally, Brockington conducted a search of the SCDAH Finding Aid to determine cultural resource investigations, and associated findings, that took place before 1990. The Finding Aid is an electronic document that lists all cultural resources projects that have occurred in a given county. The SCDAH review revealed that a limited number of pre-1990 aboveground resources surveys were conducted in Fairfield and Richland

Counties; however, the data contained in these early studies were not collected using current survey methods and standards. Furthermore, in Brockington's opinion, the surveys are not comprehensive or reliable because the condition of many of the buildings surveyed prior to 1990 likely has changed and many buildings not surveyed at that time because of age may now meet the minimum 50-year age requirement for survey. Structures recorded during pre-1990 surveys were rarely assessed for NRHP eligibility followed by a formal Determination of Eligibility ("DOE") by the SCDAH. For these reasons, Brockington did not attempt to include in the GIS database it developed for SCE&G every structure surveyed prior to 1990; however, all structures recorded prior to 1990 that are listed on the NRHP were included in the database Brockington prepared for SCE&G and field verified during the windshield survey (see #3, below).

2. **Literature Review-Archaeology**:

This review was conducted primarily by utilizing "ArchSite," which is South Carolina's online cultural resources GIS database, to determine previously recorded archaeological sites in the study area (*Appendix D*).

3. **Windshield Survey:**

A windshield survey was conducted to identify architectural/aboveground resources in the study area that appear, in the opinion of experienced architectural historians, to possess characteristics (age, architectural integrity, etc.) that would possibly make them eligible for the NRHP pending more intensive assessment studies (*Appendix E*). As outlined in National Register Bulletin #24, a windshield reconnaissance-level survey is useful in ascertaining "a general picture of the distribution of different types and styles [of architectural resources], and of the character of different neighborhoods" (Parker 1985:35-36). Windshield surveys are also useful for making *preliminary* assessments of eligibility based on the architectural integrity of properties, but not in ascertaining the historical associations a property might possess. The specific objectives of the windshield reconnaissance were to:

- Evaluate all previously recorded architectural resources (if any);
- Locate architectural resources not previously recorded and that appear to meet the minimum fifty-year age requirement for the NRHP; and,
- Identify potentially eligible NRHP properties.

4. **Phase I Archaeological Resources Survey:**

A Phase I archaeological resources survey was conducted throughout the proposed new right-of-way associated with the approximate 6 mile Blythewood-Killian Segment of the VCS1-Killian 230 kV Line (*Appendix D*). It was conducted pursuant to the CRMPA and SCE&G's obligations under the South Carolina Utility Facility Siting and Environmental Protection Act, S.C. Code Ann. § 58-33-10 et seq. (1976, as amended), to determine effects to cultural resources, if any, that could possibly occur from planned new 230 kV lines. Following the completion of line engineering and structure staking in the field along the existing right-of-way to be utilized on the remaining portion of the VCS1-Killian Line, additional Phase I archaeological resources surveys will be done pursuant to the CRMPA that will be limited to areas of planned ground disturbance that could affect archaeological resources that may be present below the ground surface. As defined in the CRMPA, ground disturbance includes, but may not be limited to, new structure locations where foundation excavation must occur and wherever grading may be required for new access roads. SCE&G does not anticipate having to construct new access roads.

Findings of the Literature Review-Architecture

There are 51 previously recorded aboveground resources within the study area (i.e., within 1.2 miles of the proposed line route, which includes both route options for the Blythewood-Killian Segment) (*Figure 5.8-1*). SCDAH classifies the resources as follows:

- Listed on the NRHP: 13
- Eligible for the NRHP: 2
- Not eligible for the NRHP: 36

In addition to the 51 previously recorded aboveground resources, two historic districts (downtown Winnsboro and the Rockton and Rion Railroad) are recorded on the NRHP.

No architectural properties designated as National Historic Landmarks (NHL) are recorded within the study area.

Findings of the Literature Review-Archaeology

Using the SCDAH Archsite database, it was determined that 103 archaeological sites have been previously recorded in within 1.2 miles of the future line (*Figure 5.8-1*). These sites are listed as follows:

- Eligible for the NRHP: 3
- Potentially eligible for NRHP: 7
- Not eligible or probably not eligible for the NRHP: 68
- Unassessed or undetermined eligibility status: 25

These previously recorded archaeological sites include 3 cemeteries, one of which is potentially eligible for the NRHP. Regardless of the NRHP eligibility of cemeteries, they are protected by statute in South Carolina. Of the total number of previously recorded archaeological resources within 1.2 miles of the future line, sixty (60) reside within ½ mile of the VCS1-Killian Line, Option 1; fifty-five (55) reside within ½ mile of Option 2.

Findings of the Windshield Reconnaissance

Brockington conducted a windshield reconnaissance of the VCS1-Killian 230 kV Line study area. In the past, much of the 96.25 square mile study area has been used for agriculture purposes, but agricultural uses are now largely limited to some of the more remote areas. The study area includes the southern portion of Winnsboro, passes the western section of Blythewood and possesses a variety of architectural types and styles. Several residential structures constructed of blue granite reside in the northern and westerns portions of the study area. Because the granite appears to have been mined from a local quarry, Brockington examined them very carefully because of possible local significance.

Early-mid twentieth century residences are dominant in the southern and eastern portions of the study area; some residential neighborhoods are also in this section of the study area. Brockington did not attempt to document each building that appears possibly eligible for the NRHP where numerous ones are present in high-density areas, such as Winnsboro or Blythewood; rather, Brockington concluded that the several areas in very close proximity to one another have potential historic district eligibility. Because of the close proximity of the potentially eligible districts in Winnsboro, Brockington did not attempt to place boundaries around the individual districts; rather, they outlined a larger holistic boundary within which the potential exists for multiple individual districts.

The Town of Blythewood also has several previously recorded resources in close proximity that collectively, and in conjunction with other potentially eligible structures, may constitute a historic district, according to Brockington, and they have delineated such a district. Additionally, on the north side of Blythewood is an area comprised of several mid-twentieth century residences that

Brockington has delineated as a potentially eligible historic district. Finally, along North Davis Street, south of Blythewood, a collection of mid-twentieth century residences and a motor court constitute a potentially eligible historic district.

The literature review (Literature Review-Architecture, hereinabove) included all of the previously recorded aboveground structures in the Study Area. During the windshield survey, it was determined that one (1) previously recorded property appears to have been demolished. Four (4) other previously recorded resources currently listed in the SCDAH database as not eligible for the NRHP are now, in the opinion of Brockington's architectural historians, potentially eligible for the NRHP.

During the windshield survey, Brockington also recorded an additional fifty-three (53) resources, including four (4) historic districts, that appear to retain sufficient architectural integrity to be considered eligible for inclusion in the NRHP. Numerous other properties that appear to be 50 years old (thus, meeting the minimum standard for NRHP eligibility consideration) were observed throughout the study area and, as such, are properties that would be recorded by architectural historians during a standard Section 106 survey. Due to significant alterations or modifications, Brockington determined that these properties appear to have lost their architectural integrity and may not meet the criteria of eligibility for listing on the NRHP under Criterion C; however, these properties, which Brockington did not include in the windshield survey database, may possess historical significance which could only be determined through archival research such as would be required for a Section 106 cultural resources survey. For the VCS1-Killian 230 kV Line project, Brockington recommended that a viewshed analysis be conducted after new structure locations have been determined. A viewshed analysis would delineate the specific areas that will have high probability of views of the VCS1-Killian Line. Combined, these delineated high probability areas would constitute the "area of potential effect" ("APE"), and could be used as a basis for a Phase I Architectural Survey for full Section 106 compliance. A Phase 1 Architectural Survey would include more intensive analysis of structures and the development of sufficient information to solicit eligibility determinations from SCDAH. The results of Brockington's windshield survey are summarized in a letter report dated May 20, 2011 (*Appendix E*).

Pursuant to Brockington's recommendation that a viewshed analysis be conducted, Pike Energy Solutions, LLC, working closely with Brockington on SCE&G's behalf, conducted a viewshed analysis from thirteen (13) structures listed on the NRHP, two (2) structures eligible for the NRHP, and two NRHP historic districts within 2 km (1.2 miles) of the VCS1-Killian Line based on preliminary engineering data showing new structure locations and structure heights. The

analysis concluded that the VCS1-Killian 230 kV Line will have no adverse effect on NRHP listed or eligible resources within 1.2 miles of the line, and the findings were presented by SCE&G and Pike Energy Solutions representatives to the SHPO during a meeting at SHPO offices on June 13, 2011. The viewshed analysis, entitled "*Visual Impact Assessment of NRHP-Listed/Eligible Properties within 2 km of the VCS1-Killian 230 kV Line*," is included in *Appendix H.*

Findings of the Phase I Archeological Survey

In March and June of 2011, Brockington conducted a Phase I archaeological resources survey of the approximate 6 mile Blythewood-Killian Segment of the VCS1-Killian 230 kV Line. This is the only segment of the approximate 37 mile line route that will not be built on existing SCE&G right-of-way. SCE&G conducted a comprehensive siting study (Section 2.2) to determine the location of the 6 mile segment and has surveyed the route. As of the date of this report, right-of-way acquisition is in progress.

Brockington conducted the Phase I archaeological survey on SCE&G's behalf for the purpose of determining if any historic properties would be affected by ground disturbance associated with right-of-way preparation and line construction. Survey methods undertaken during the investigation process were conducted in compliance with Section 106 of the National Historic Preservation Act of 1966 (as amended through 2000), and 36 CFR 800 (Protection of Historic Properties). Survey tasks were completed in compliance with criteria defined under the Secretary of the Interior's Professional Qualification Standards (36 CFR Part 61).

Primary archaeological resource investigations involved systematic 30-meter interval shovel testing along two transects spaced 30 meters offset east and west from the proposed centerline of the future 230 kV line. The area investigated is the Area of Potential Effect (APE). The Phase I survey included a review of previously recorded archaeological sites within or near the proposed transmission line right-of-way (see Literature Review-Archaeology, hereinabove), and a thorough pedestrian survey within the proposed right-of–way.

Background research was conducted at the South Carolina Institute of Archaeology and Anthropology (SCIAA) in Columbia, South Carolina, to determine if any previously recorded archaeological sites exist within the footprint of the proposed corridor. In addition, the list of NRHP properties was reviewed at the SCIAA. Thirty-five previously recorded archaeological sites have been recorded within and in close proximity to the right-of-way. Two previously recorded sites (38RD0148 and 38RD1275) fall within the right-of-way. These sites were revisited during the

course of fieldwork, but no further material or features were recovered or observed; these two previously recorded sites have been determined not eligible for the NRHP.

The southern segment of the proposed right-of-way is located near the historic area generally believed to be associated with the Civil War Skirmish at Killian's Mill. Fought between the 18th and 20th of February, 1865, Killian's Mill was a small rear guard action conducted by two brigades of Virginia's First Division Cavalry under the command of Matthew Calbraith Butler. Following the sack of Columbia, South Carolina, by Sherman during his March to the Sea campaign, Union troops under the direction of General Preston Blair were delayed in their advance towards Winnsboro when Butler's men destroyed the dam along Killian's mill pond and creek. The skirmish was brief and proved marginally effective in checking the Union advance. Although the exact location of the skirmish and dam site is currently unknown, a historic marker along Farrow Road commemorates the event. During the Phase I survey, Brockington searched for aboveground and subsurface evidence of the skirmish, but no surface features indicative of Civil War activity were identified and no cultural material associated with the Civil War era was recovered. It is likely that any aboveground features of the skirmish were destroyed in the construction of Farrow and Killian Roads due to grading and leveling of the surrounding areas.

In total, 444 shovel tests were excavated along the 5.8-mile proposed transmission line right-of-way resulting in the identification of six previously unrecorded archaeological sites and one Isolated Find. Five of these sites (38RD1374, 38RD1375, 38RD1376, 38RD1377, and 38RD1378) are all low-density prehistoric lithic and artifact scatters, while one (38RD1379) represents the remains of a historic homestead. These sites are typical of low-density prehistoric scatters and ruinous historic sites located throughout the southeast and do not generally display the wealth of material and features often associated with significant archaeological resources in South Carolina. The research potential of these sites is extremely limited and these sites do not warrant further study. They are all, therefore, recommended not eligible for the NRHP. In addition, isolated finds are not considered sites and are not considered eligible for NRHP listing.

In its report (*A Phase I Archaeological Resources Survey of the VCS1-Killian 230 kV Line, Richland County, South Carolina*), Brockington recommends no further research in regard to archaeological resources ". . . as no significant cultural resources will be adversely impacted" by the VCS1-Killian 230 kV Line (*Appendix D*).

Charts 5.8-1 lists cultural resource factors listed in the records of the South Carolina Institute of Anthropology and Archaeology ("SCIAA") and South Carolina Department of Archives

and History ("SCDAH") that are present in the vicinity of the VCS1-Killian 230 kV Line route, Options 1 and 2.

Chart 5.8-1 Affected Cultural Resources

	Number/Acres
VCS1-Killian 230 kV Line (Option 1)	
Number of Recorded Archaeological Sites Listed on the NRHP in the R/W	0
Number of Recorded Archaeological Sites Eligible/Potentially Eligible/Eligibility Undetermined for the NRHP in the R/W	3
Number of Recorded Archaeological Sites Not Eligible for NRHP in the R/W	3
Number of Recorded Archaeological Sites Listed on the NRHP within 100' of the R/W	0
Number of Recorded Archaeological Sites Eligible/Potentially Eligible/Eligibility Undetermined for the NRHP within 100' of the R/W	3
Number of Recorded Archaeological Sites Not Eligible for NRHP within 100' of the R/W	1
Number of Historic Sites Listed on the NRHP in the R/W	0
Number of Historic Sites Eligible/Potentially Eligible for the NRHP in the R/W	0
Number of Historic Sites Listed on the NRHP within ¼ mile of the transmission line	3
Number of Historic Sites Eligible/Potentially Eligible for the NRHP within ¼ mile of the transmission line	14
Number of Historic Sites Listed on the NRHP between ¼ and ½ mile of the transmission line	5
Number of Historic Sites Eligible/Potentially Eligible for the NRHP between ¼ and ½ mile of the transmission line	9
Number of Historic Sites Listed on the NRHP between ½ and 1 ¼ mile of the transmission line	5
Number of Historic Sites Eligible/Potentially Eligible for NRHP between ½ and 1 ¼ mile of the transmission line	32
Acres of Designated Historic District Listed on the NRHP in the R/W	0.3
Acres of Designated Historic District Potentially Eligible for the NRHP in the R/W	10.0
Acres of Designated Historic District Listed on the NRHP within 100' of the R/W	1.1
Acres of Designated Historic District Potentially Eligible for the NRHP within 100' of the R/W	30.1
Acres of Designated Historic District Listed on the NRHP between 100' and 1/4 mile of the R/W	46.2
Acres of Designated Historic District Potentially Eligible for the NRHP between 100' and 1/4 mile of the R/W	451.8
Acres of Designated Historic District Listed on the NRHP between 1/4 and 1/2 mile of the R/W	82.3
Acres of Designated Historic District Potentially Eligible for the NRHP between 1/4 and 1/2 mile of the R/W	391.8
Acres of Designated Historic District Listed on the NRHP between 1/2 and 1-1/4 mile of the R/W	220.0
Acres of Designated Historic District Potentially Eligible for the NRHP between 1/2 and 1-1/4 mile of the R/W	566.9
VCS1-Killian 230 kV Line (Option 2)	
Number of Recorded Archaeological Sites Listed on the NRHP in the R/W	0
Number of Recorded Archaeological Sites Eligible/Potentially Eligible/Eligibility Undetermined for the NRHP in the R/W	2
Number of Recorded Archaeological Sites Not Eligible for NRHP in the R/W	2
Number of Recorded Archaeological Sites Listed on the NRHP within 100' of the R/W	0
Number of Recorded Archaeological Sites Eligible/Potentially Eligible/Eligibility Undetermined for the NRHP within 100' of the R/W	2
Number of Recorded Archaeological Sites Not Eligible for NRHP within 100' of the R/W	1
Number of Historic Sites Listed on the NRHP in the R/W	0
Number of Historic Sites Eligible/Potentially Eligible for NRHP in the R/W	0
Number of Historic Sites Listed on the NRHP within ¼ mile of the transmission line	3
Number of Historic Sites Eligible/Potentially Eligible for NRHP within ¼ mile of the transmission line	14
Number of Historic Sites Listed on the NRHP between ¼ and ½ mile of the transmission line	5
Number of Historic Sites Eligible/Potentially Eligible for NRHP between ¼ and ½ mile of the transmission line	11
Number of Historic Sites Listed on the NRHP between ½ and 1 ¼ mile of the transmission line	5
Number of Historic Sites Eligible/Potentially Eligible for NRHP between ½ and 1 ¼ mile of the transmission line	27
Acres of Designated Historic District Listed on the NRHP in the R/W	0.3
Acres of Designated Historic District Potentially Eligible for the NRHP in the R/W	10.0
Acres of Designated Historic District Listed on the NRHP within 100' of the R/W	1.1
Acres of Designated Historic District Potentially Eligible for the NRHP within 100' of the R/W	30.1
Acres of Designated Historic District Listed on the NRHP between 100' and 1/4 mile of the R/W	46.2
Acres of Designated Historic District Potentially Eligible for the NRHP between 100' and 1/4 mile of the R/W	453.6
Acres of Designated Historic District Listed on the NRHP between 1/4 and 1/2 mile of the R/W	82.3
Acres of Designated Historic District Potentially Eligible for the NRHP between 1/4 and 1/2 mile of the R/W	389.9
Acres of Designated Historic District Listed on the NRHP between 1/2 and 1-1/4 mile of the R/W	220.0
Acres of Designated Historic District Potentially Eligible for the NRHP between 1/2 and 1-1/4 mile of the R/W	566.9

SCE&E will work closely with the SHPO and the USACE to comply with all terms and conditions of the Cultural Resources Management Plan and Agreement during final engineering of the VCS1-Killian 230 kV Line and during line construction. Based on the findings of the cultural resources investigations conducted by Brockington and the viewshed analysis conducted by Pike Energy Solutions, SCE&G is confident that the VCS1-Killian 230 kV Line will have no adverse impact on cultural resources including visual impacts, which are largely mitigated by the extent to which existing lines are being removed and replaced by the new line.

5.9 Scenic Resources

The visual implications of transmission lines are influenced by several factors. These include the distance from the viewer, the number of structures viewed, whether visible structures are seen against backdrops (vegetation, terrain, man-made elements) or silhouetted against the skyline, the degree of foreground elements that will offer screening, the amount of vegetative modification which contrasts with surrounding landscapes, and the overall scenic condition (landscape content or context; cultural modifications, etc.) of the area in which the facility is seen. The potential visual implications of the future VCS1-Killian 230 kV Line were considered in two categories: 1) where the future line will replace an existing line within existing SCE&G right-of-way; and 2) where a new line will be built on new right-of-way (i.e., the newly sited approximate 6 mile Blythewood-Killian Segment of the line).

Replacement of Existing Lines within Existing Right-of-Way

Negligible visual change will occur along approximately 31 miles of the VCS1-Killian 230 kV Line where it will replace existing 115 kV lines on existing right-of-way for the following reasons:

1. Except for a short segment on the VCSNS site, the approximate 14 mile segment of the line from the VCSNS Switchyard 1 to Winnsboro will involve removing an existing 115 kV line on wooden H-Frame structures and replacing it with a double-circuit 230/115 kV line on single-shaft steel poles. Although the new structures will be somewhat higher than those replaced, they will have a cleaner silhouette at the ground line and will be spaced further apart;
2. From Winnsboro to the future Blythewood 230/115 kV Substation site, an existing single-circuit 115 kV line supported by single-shaft steel poles will be replaced by the double-circuit 230/115 kV line on single-shaft steel poles;

3. By utilizing existing cleared right-of-way, no visual change will occur as a result of vegetative modifications; and,
4. Except for a 4.2 mile segment of VCS1-Killian Line that will run parallel to Interstate Highway 77 through a largely undeveloped area, the scenic quality surrounding the line route between Winnsboro and the future Blythewood 230/115 kV Substation site is highly modified; therefore, visual recognition of the change in the appearance of the line (line to be removed v. new line) will be mitigated by the complexity of its surroundings.

To illustrate the change in visual conditions that will result from replacing existing structures with new 230/115 kV single-pole, double-circuit structures, SCE&G prepared photographic simulations showing the future structures. The simulations are based on preliminary pole heights and locations taken from preliminary engineering data. Photographs 5.9-1 and 5.9-2 illustrate the replacement of single-circuit 115 kV H-Frame structures with 230/115 double-circuit steel pole structures; photographs 5.9-3 and 5.9-4 illustrate the replacement of existing 115 kV single-circuit steel poles with 230/115 kV steel poles with vertical circuit configuration.

Photograph 5.9-1: Existing Conditions-Single-Circuit 115 kV Wooden H-Frame Structures

Photograph 5.9-2: Photographic Simulation Showing Double-Circuit 230/115 kV Steel Pole Structures (back to back configuration)

Photograph 5.9-3: Existing Conditions-Single-Circuit 115 kV Single Steel Pole Structures

Photograph 5.9-4: Photographic Simulation Showing Double-Circuit 230/115 kV Steel Pole Structures (stacked vertical configuration)[5]

New 230/115 kV Line on New Right-of-Way (approximate 6 mile Blythewood-Killian Segment)

Line visibility factors were carefully evaluated during the siting process for the Blythewood-Killian Segment of the VCS1-Killian 230 kV Line, and the selected route will minimize its visibility from roads and residences. An extensive investigation was conducted to quantify and compare the visual effects on residences of each alternate route considered. Each residence along the alternate routes was evaluated by considering view distance to the line, landscape content, and degree of screening to determine a "Visual Probability" score.

[5] *SCE&G prepared this photographic simulation (Photograph 5.9-4) for the Town of Blythewood to illustrate one possible structure type in the vicinity of Blythewood Road. Other structure types may be utilized if desired by the Town.*

Chart 5.9-1 shows the number of residences along the selected route that are predicted to have a view of the line and the predicted view condition (Visual Probability):

Chart 5.9-1 Residential Visibility Probability Along the VCS1-Killian 230 kV Line (Blythewood-Killian Segment)

Visual Probability*	Number of Residences
Very High	00
High	00
Moderate-High	00
Moderate	09
Low-Moderate	04
Low	06
Very Low	86

* The visual probability conditions are defined as follows:

Very High: Project element(s) will dominate the view because of proximity to the viewpoint and/or the number of elements viewed; because their setting in the landscape commands strong visual attention; or a combination of these factors.

High: Project element(s) will dominate the view because of their perceived size from the viewpoint and/or the number of elements viewed; because their setting in the landscape commands strong visual attention; or a combination of these factors. The elements of the existing landscape context will continue to be a strong influence in the view shed.

Moderate-High: Project element(s) and the surrounding landscape character will command approximately equal visual attention in the view.

Moderate: Project element(s) will be slightly subordinate to existing elements of the landscape and will not significantly alter the existing landscape character.

Low-Moderate: Project element(s) will be easily recognized in the landscape but will command very little attention in the view.

Low: Project element(s) will be visible but will be completely subordinate to the broader context of the landscape.

Very Low: Project element(s) will not be visually evident to casual viewers.

SCE&G completed computer modeling for the VCS1-Killian Line route considering topography and vegetation; and completed field studies to determine the degree to which the

future line will be visible from public roads. In summary, approximately 23 miles of the VCS1-Killian Line, Option 1, will be visible from public roads where existing lines are now visible. For the 6 mile (approximate) Blythewood-Killian Segment on new right-of-way, approximately 4 miles will be visible; therefore, approximately 27 miles of the VCS1-Killian Line, Option 1, will be visible from public roads. If built along Option 2, the line will be visible for approximately 29 miles of its approximate 37 mile length (*Figure 5.9-1*).

In conclusion, the additional impact on visual effects (i.e., future conditions compared to current conditions) of the VCS1-Killian 230 kV Line, Option 1 or Option 2, will be low due to the utilization of existing right-of-way and replacement of existing lines.

5.10 Rare, Threatened and Endangered Species

Federally Listed Plant and Animal Species

Ground surveys were conducted for federally-listed rare, threatened and endangered plant and animal species within the transmission line rights-of-way corridors for all of the new 230 kV lines associated with the VCSNS Units 2 and 3 project, including the VCS1-Killian 230 kV Line route. Prior to beginning field surveys, the U.S. Fish and Wildlife Service ("USFWS") and the South Carolina Department of Natural Resources ("SCDNR") were contacted to obtain the most current known federally-protected species occurrence information. Following a meeting in Charleston, South Carolina, with USFWS officials to discuss field investigation methods and requirements, the agency provided SCE&G a geographic information system ("GIS") data layer containing the most recent federally-protected species occurrence information, including location data, which was then overlaid with maps depicting all of SCE&G's proposed transmission line corridors associated with the VCSNS Units 2 and 3 project (*Figure 5.10-1*). The USFWS data layer was cross-referenced with SCDNR's "South Carolina Rare, Threatened and Endangered Species Inventory" database to ensure complete coverage of known protected species occurrences. The USFWS's "South Carolina List of Endangered, Threatened and Candidate Species, July 2010" was used to determine which species surveys would be conducted for each county that the proposed transmission lines are located. According to agency records and at the time field investigations began, none of the federally-listed threatened and endangered species was known to occur within or along the margins of any of the VCSNS Units 2 and 3 transmission corridors (Gaddy and Siler, 2010).

Potential habitats for all of the potentially-occurring federally-listed species were also plotted on study area mapping before fieldwork began. These potential habitat maps were

compiled using natural color and infrared imagery of the study area with topographic, soil, and wetland features overlaid on the natural color and infrared imagery. Field investigations were conducted in those areas where apparent appropriate habitat was contained within or along the margins of the transmission line corridors (Gaddy and Siler, 2010). Approximately 87 field sites containing potential habitat were field investigated.

Surveys for the species listed as occurring in those counties through which the proposed transmission lines will traverse were conducted between October 19 and November 10, 2010. Based on field investigations, it was determined that the four new 230 kV lines associated with the VCSNS Units 2 and 3 project, including the VCS1-Killian 230 kV Line, are not likely to disturb the bald eagle; will have no effect on the shortnose sturgeon and rough-leaved loosestrife; and may affect, but are not likely to adversely affect, the frosted flatwoods salamander, smooth coneflower, Carolina heelsplitter, pondberry, wood stork, Canby's dropwort, and red-cockaded woodpecker. No federally-listed threatened or endangered species were found within or immediately adjacent to any the proposed transmission line corridors (*Appendix F*).

State Listed Plant and Animal Species

In addition to conducting field investigations associated with federally-listed species, an investigation was conducted to search for state-listed endangered, threatened, and candidate species on the transmission line rights-of-way corridors within which the transmission lines associated with the VCSNS Units 2 and 3 project will be built, including the VCS1-Killian 230 kV Line.

A literature and internet review of the state-listed species potentially-occurring in or near the transmission line corridors was conducted in October 2010. Over 170 species of state-listed plants and animals are known from the seven counties within which the new lines will be located. Of these 170 species, 41 species are known to occur within five miles of the proposed routes for new transmission lines, including the VCS1-Killian 230 kV Line. Potential habitat for only 17 of these 41 species occurs within the rights-of-way corridors within which the new transmission lines will be built; therefore, the field investigation for state-listed species concentrated on these 17 species.

Before fieldwork for this inventory began, all SCDNR records—historical and current—for these 17 species (S. C. Department of Natural Resources, 2010) were plotted on maps containing all of the new SCE&G transmission line right-of-way corridors associated with the VCSNS Units 2 and 3 project. These potential habitats maps were compiled using natural color and infrared

imagery of the study area with topographic, soil, and wetland features overlaid on the natural color and infrared imagery. Field investigations were conducted in those areas where apparent appropriate habitat was contained within or along the margins of the transmission line corridors. According to the SCDNR records, at the time this field inventory began, none of the 17 species was known to occur within or along the margins of any of the transmission right-of-way corridors.

Thirty-three sites in Calhoun, Fairfield, Newberry, Lexington, and Richland Counties were visited in late October 2010, and 20 additional sites in Orangeburg and Dorchester Counties were field-checked in early November 2010. No state or federal listed species were found along the route of the VCS1-Killian 230 kV Line. Only one state-listed species was found in the right-of-way corridors; Carolina St. Johns-wort (*Hypericum nitidum*) was found in the VCS-St. George #1 and #2 right-of-way corridor in Lexington County (*Appendix G*).

Based on the literature review of federal and state-listed rare, threatened and endangered species and extensive field investigations, adverse effects to protected species are unlikely to occur during construction of the VCS1-Killian 230 kV Line. Nevertheless, if SCE&G encounters any plant or animal species of concern during construction, proper agencies will be notified and appropriate steps will be taken to protect the resources.

5.11 Population

Population distribution and density was modeled as a GIS data layer along the VCS1-Killian 230 kV Line based on Year 2000 Census data (*Figure 5.11-1*). Chart 5.11-1 displays the length of each route in miles that will pass through various population density areas:

Chart 5.11-1: Population Density along the VCS1-Killian 230 kV Line Route

	Miles
VCS1-Killian 230 kV Line (Option 1)	
< 0.5 Acres per Person	0.3
0.51 - 1 Acres per Person	0.8
1.1 - 2 Acres per Person	3.4
2.1 - 4 Acres per Person	1.1
4.1 - 10 Acres per Person	4.0
> 10 Acres per Person	27.8
VCS1-Killian 230 kV Line (Option 2)	
< 0.5 Acres per Person	0.3
0.51 - 1 Acres per Person	1.4
1.1 - 2 Acres per Person	2.4
2.1 - 4 Acres per Person	1.4
4.1 - 10 Acres per Person	4.0
> 10 Acres per Person	27.7

5.12 Aviation

Federal Aviation Administration ("FAA") Regulations, Part 77, establishes standards for determining obstructions in navigable airspace and sets forth requirements for FAA notification of proposed construction. These regulations require FAA notification for any construction over 200 feet in height above ground level. Also, notification is required if the obstruction is more than specified heights and falls within any restricted airspace in the approach to airports. For airports with runways longer than 3,200 feet, the restricted space extends 20,000 feet (3.3 nautical miles) from the runway. For airports with runways 3,200 feet or less, the restricted space extends 10,000 feet (1.7 nautical miles). For heliports, the restricted space extends 5,000 feet (0.8 nautical miles). No airports or airstrips are within 3.3 nautical miles of the project. No VCSNS 230 kV Line structures will exceed 200 feet in height. Chart 5.12-1 lists the number of aviation facilities in close proximity to the VCS1-Killian 230 kV Line Route *(Figure 5.12-1).*

Chart 5.12-1: Aviation Facilities in the Vicinity of the VCS1-Killian 230 kV Line Route

	Number of Facilities
VCS1-Killian 230 kV Line (Option 1)	
Private Use Airport within 10,000' of the proposed transmission line	0
Private Use Airport within 20,000' of the proposed transmission line	0
Public Use Airport within 10,000' of the proposed transmission line	0
Public Use Airport within 20,000' of the proposed transmission line	1
Ultralight Airstrip within 5,000' of the proposed transmission line	0
Heliport within 5,000' of the proposed transmission line	1
VCS1-Killian 230 kV Line (Option 2)	
Private Use Airport within 10,000' of the proposed transmission line	0
Private Use Airport within 20,000' of the proposed transmission line	0
Public Use Airport within 10,000' of the proposed transmission line	0
Public Use Airport within 20,000' of the proposed transmission line	1
Ultralight Airstrip within 5,000' of the proposed transmission line	0
Heliport within 5,000' of the proposed transmission line	1

Following engineering of the VCS1-Killian 230 kV Line, SCE&G, if required by the design, will file proper notifications with the FAA, consult with them as necessary to resolve any conflicts and determine any measures that must be implemented to insure aviation safety.

5.13 Noise, Radio, and Television Interference

When a substation or transmission line is in operation, an electric field is generated in the air surrounding the current-carrying conductors. This electric field allows corona to occur, and this corona can create an audible noise. Corona is the partial electrical breakdown of the insulating properties of the air in the vicinity of the conductors of a transmission line. When the intensity of the electric field at the conductor surface exceeds the breakdown strength of the surrounding air, a

corona discharge occurs at the conductor surface. Energy and heat are dissipated in very small volumes near the surface of the conductors. Part of this energy is in the form of small local pressure changes that result in audible noise.

Corona-generated audible noise can be characterized as a hissing, cracking sound which, under certain conditions, is accompanied by a 120-hertz (Hz) hum. Corona-generated audible noise is of concern primarily for electrical lines and equipment that are operated at 230 kV and higher during inclement weather conditions. The conductors of high voltage transmission lines are designed to be corona-free under ideal conditions. However, slight variations and irregularities in the conductor surface can cause distorted electric fields near the conductor surface, and the occurrence of corona. The most common source of distorted electric fields at the conductor surface is water droplets on, or dripping from, the conductors. Therefore, audible noise from high-voltage transmission lines is generally associated with, and enhanced by, wet weather (i.e., wet conductor) phenomenon, which can occur during periods of rain, fog, snow or icing. These conditions are expected to occur infrequently and will usually be limited to a "hissing" sound that will be 40 dB or less (40 dB is comparable to a quiet library). During fair weather, insects and other contaminants on the conductor can also serve as sources of corona.

Corona on transmission line conductors can also generate electromagnetic interference for radio and television receivers. Corona generated interference is localized and not very noticeable outside the transmission line right-of-way.

Another type of radio and television interference, known as gap-type noise, is caused by an oxidized film at the point of contact between two metallic electric hardware pieces. The film acts as an insulator between the surfaces and small electric sparks, which produce noise and interference. Gap type interference normally causes radio or television interference within a mile or less of the source. When such an interference condition occurs, corrective actions can be taken to eliminate the source.

SCE&G's construction and maintenance practices will ensure proper connections of current carrying equipment throughout the operational life of the VCS1-Killian 230 kV Line; therefore, no adverse audible noise or radio and television interference effects are expected to be associated with its operation.

5.14 Safety

To provide for public safety and protection, SCE&G will design and construct the VCS1-Killian 230 kV Line in a manner that will comply with, or exceed, the latest standards of the National Electrical Safety Code in effect at the time of construction. SCE&G commits to continue their long-standing tradition of operating and maintaining their facilities in a manner that will ensure public safety over the life of these facilities.

5.15 Electric and Magnetic Fields

Electric and magnetic fields ("EMF") exist anywhere there is electricity, whether that electricity is being produced, distributed, or consumed. Thus EMF is created by power lines, residential wiring, appliances, and even by the earth itself. Since the early 1970's, hundreds of studies have debated the possible health effects of EMF. In 1996, the National Academy of Sciences ("NAS"), National Research Council, completed its review of the literature on the possible health risks of residential exposure to power-frequency electric and magnetic fields. In 1999, the National Institute of Environmental Health Sciences ("NIEHS") completed a comprehensive program of research and analysis to clarify the potential health risks from exposure to extremely low frequency electric and magnetic fields.

The NAS report stated, "Based on a comprehensive evaluation of published studies relating to the effects of power frequency electric and magnetic fields on cells, tissues, and organisms (including humans), the conclusion of the committee is that the current body of evidence does not show that exposure to these fields presents a human-health hazard." The NAS went on to say, "No conclusive and consistent evidence shows that exposures to residential electric and magnetic fields produce cancer, adverse neurobehavioral effects, or reproductive and developmental effects."

NIEHS concluded that the evidence for a risk of cancer and other human disease from the electric and magnetic fields around power lines is "weak." NIEHS stated that "the results of the EMF-RAPID program do not support the contention that the use of electricity poses a major unrecognized public-health danger." NIEHS Director Kenneth Olden, Ph.D., said, "The lack of consistent, positive findings in animal or mechanistic studies weakens the belief that this association is actually due to EMF, but it cannot completely discount the epidemiological findings. For that reason, and because virtually everyone in the United States is routinely exposed to EMF, efforts to encourage reductions in exposure should continue."

EMF levels drop sharply with increased distance from a power source. SCE&G has published information listing the typical 60 hertz magnetic field levels associated with 115 kV lines. Directly under the line, the range is 2.1-19.3 milliGauss (mG); at the edge of the right-of-way, the range is 0.6-3.4 mG; 50' from the edge of the right-of-way, the range is 0.3-1.9 mG. This data is the same as published by Duke Energy Corporation with respect to 100 kV lines. Moreover, Duke Energy publishes the following information regarding 230 kV Lines (SCE&G has not published similar data for 230 kV lines):

Under the line:	4.5 - 29.0 mG
Edge of right-of-way:	1.9 - 6.4 mG
50' from edge of right-of-way:	1.0 - 3.5 mG

Generally, the normal background magnetic field strength levels away from electrical devices are 0.6-1.5 mG. In homes, typical daily magnetic field strength levels around common electrical devices and appliances are higher. The following are typical magnetic field strength ranges for certain equipment as published by SCE&G and Duke Energy:

Equipment	1 Inch	1 Foot	3 Feet
Microwave oven	140.0 mG	65.0 mG	10.0 mG
Refrigerator	6.0 mG	4.0 mG	1.2 mG
Electric Range	250.0 mG	25.0 mG	2.0 mG
Electric Razor	500.0 mG	-	-
Hair Dryer	100.0 mG	30.0 mG	-
Electric can opener	5,000.0 mG	-	-
Computer terminal / TV	26.0 mG	3.4 mG	1.2 mG
Electric Clock	130.0 mG	15.5 mG	2.5 mG

5.16 Ozone

High-voltage transmission facilities may, under some conditions, produce small amounts of ozone as a consequence of corona discharge. This discharge is caused by abrasions on conductors or foreign-particle contamination of the insulators or hardware. SCE&G takes care to eliminate or minimize corona discharge from random arcing through careful design of the connections, fittings, hardware, and insulation.

Organizations such as the Illinois Institute of Technology have conducted extensive field tests under various weather conditions to detect ozone around high-voltage substations and 765

kV lines. These tests showed no significant adverse effects on plants, animals, or humans from levels of ozone that may be produced in operating transmission facilities at voltages up to 765 kV.

The VCS1-Killian 230 kV Line should not produce any detectable amount of ozone under any operating condition, and thus will pose no threat to environmental quality.